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A USERS GUIDE TO THE DATA BUS NETWORK SIMULATOR (DBNS) PROGRAM.(U)
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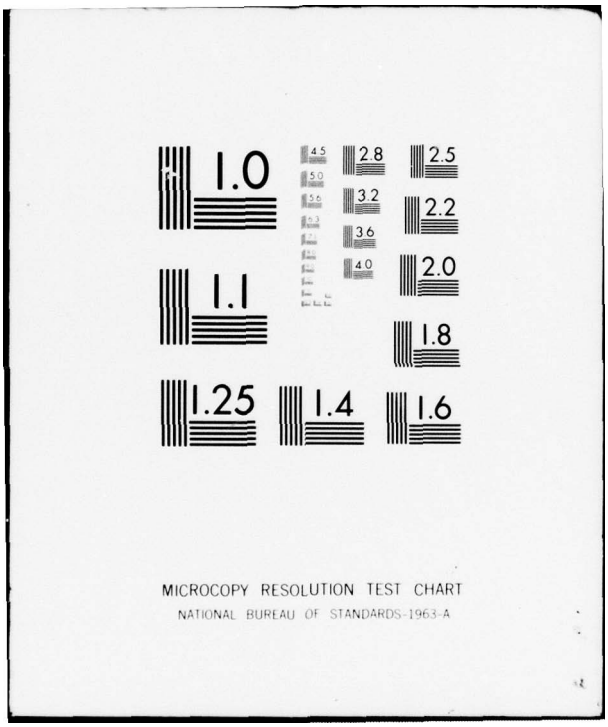
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AFAL-TR-77-47

A USERS GUIDE TO THE DATA BUS NETWORK SIMULATOR (DBNS) PROGRAM

JOHN E. CAMP
SYSTEM SIMULATION BRANCH
SYSTEM AVIONICS DIVISION

APRIL 1977

TECHNICAL REPORT AFAL-TR-77-47
FINAL REPORT FOR PERIOD APRIL 1976 to NOVEMBER 1976

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AIR FORCE AVIONICS LABORATORY
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This report describes a FORTRAN coded simulator program for predicting waveforms on a data bus network consisting of a main bus with numerous stubs connected via transformer couplers. Bus operation is at baseband with configurations compatible with MIL-STD-1553. The report included program operation, operating instructions and listings of program and data. Sample output plots are included for program verification.

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FOREWORD

This technical report describes the results of work performed in the System Simulation Branch, System Avionics Division, Air Force Avionics Laboratory, Wright-Patterson Air Force Base, Ohio. This report was started under the in-house work unit 20030710 and was completed in support of work unit 20520301. These units were directed technically by Mr. Michael J. O'Connor.

The author acknowledges the assistance of Mr. Mike Price of Digital Equipment Corporation and Mr. Dale Stimson of Scientific Consultants Inc. Their time and effort to help enhance, modify and debug this program was of great value.

Credit is due to IBM Corporation, Huntsville, Alabama, for preparing the original documentation for this program.

Appreciation is extended to Ms. Sue Collins for her typing and illustrations.

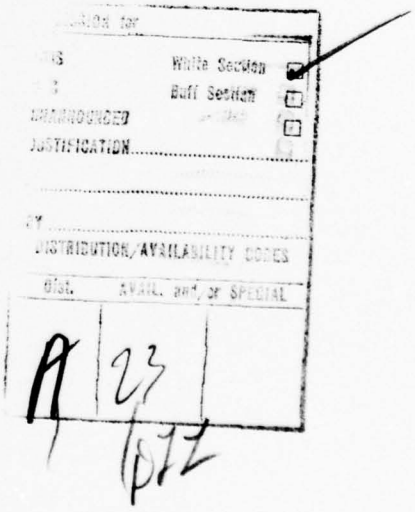


TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

LIST OF TABLES

SECTION I

INTRODUCTION

1. GENERAL

This report describes the results of a 6 month effort to document, modify and augment the Data Bus Network Simulation (DBNS) Program. This report is also a user's manual describing how to use this program.

This program will aid the data bus designer in predicting the waveform characteristics of a data bus network which consists of a main bus with stubs connected via transformer couplers. The bus operation is at base band with configurations compatible with MIL-STD-1553.

No attempt has been made, in this report, to analyze the data output of this program. This task will be at the discretion of the user.

2. HISTORY

This simulation was initially developed by IBM Corporation, Federal Systems Division, Huntsville, Alabama, under Air Force Contract # F33615-75-C-1133. The additional software aids, the Cal-Camp and Tektronix plots, were developed in-house.

3. PROGRAM CAPABILITIES

Given a data bus and its associated stubs and their unique characteristics (line impedance, skin effect, stub isolation resistance, line attenuation, impedance of stub termination), this program will graphically evaluate the data bus system. For user convenience, the bus and stub characteristics can be changed to reflect a different data bus system.

4. SYNOPSIS OF SUCCEEDING SECTIONS

Section II contains the explanation and flow charts of the main program and its associated subroutines. The operational description of this program is in Section III. The description of the input data is in Section IV. Section V has a brief introduction to the output data (plots).

Appendix A will have the compiled listings of the program and associated subroutines. Appendix B will have the example of the input data. Appendix C has representative examples of the program output.

SECTION II

MAIN PROGRAM AND SUBROUTINE DESCRIPTIONS

There is one program (MAIN) with seven associated subroutines presented in this section. Three of these subroutines were developed in-house (PLCOMP, PLTCC and PLTTX); the remaining software package was originally written by IBM and modified in-house. This program is a tool whereby the multiplex hardware designer can arrive at a scheme which will provide the best possible bussing network.

1. ORGANIZATION

This program is structured to independently maintain the time, amplitude and phasing of all signal waveforms propogating through a typical data bus network. Due to both stub and line input/output terminations, there is multipath propagation and reflections.

In Figure 1, the data waveforms propagate from left to right in filter sequence FIL1 to FIL3Ø. FIL functions implement the transmission line segments. Transmission reflections travel from right to left in descending order through FIL60 to FIL31. Twenty nine ISTUB filter paths corresponding to the data bus stubs connect the transmission sequence and the reflection sequence. Data traveling down the ISTUB paths change from the transmission mode to the reflection mode at the mid point (labeled End of Bus).

A typical stub path starts through TRANS1, the transfer function of a coupler from bus to stub. TRANS1 provides the capacitive loading of the stub. The output of TRANS1 travels through the FIL section to the stub termination indicated by the Γ4 calculation. Γ4 is the stub end reflection coefficient which determines the portion of the signal to be sent

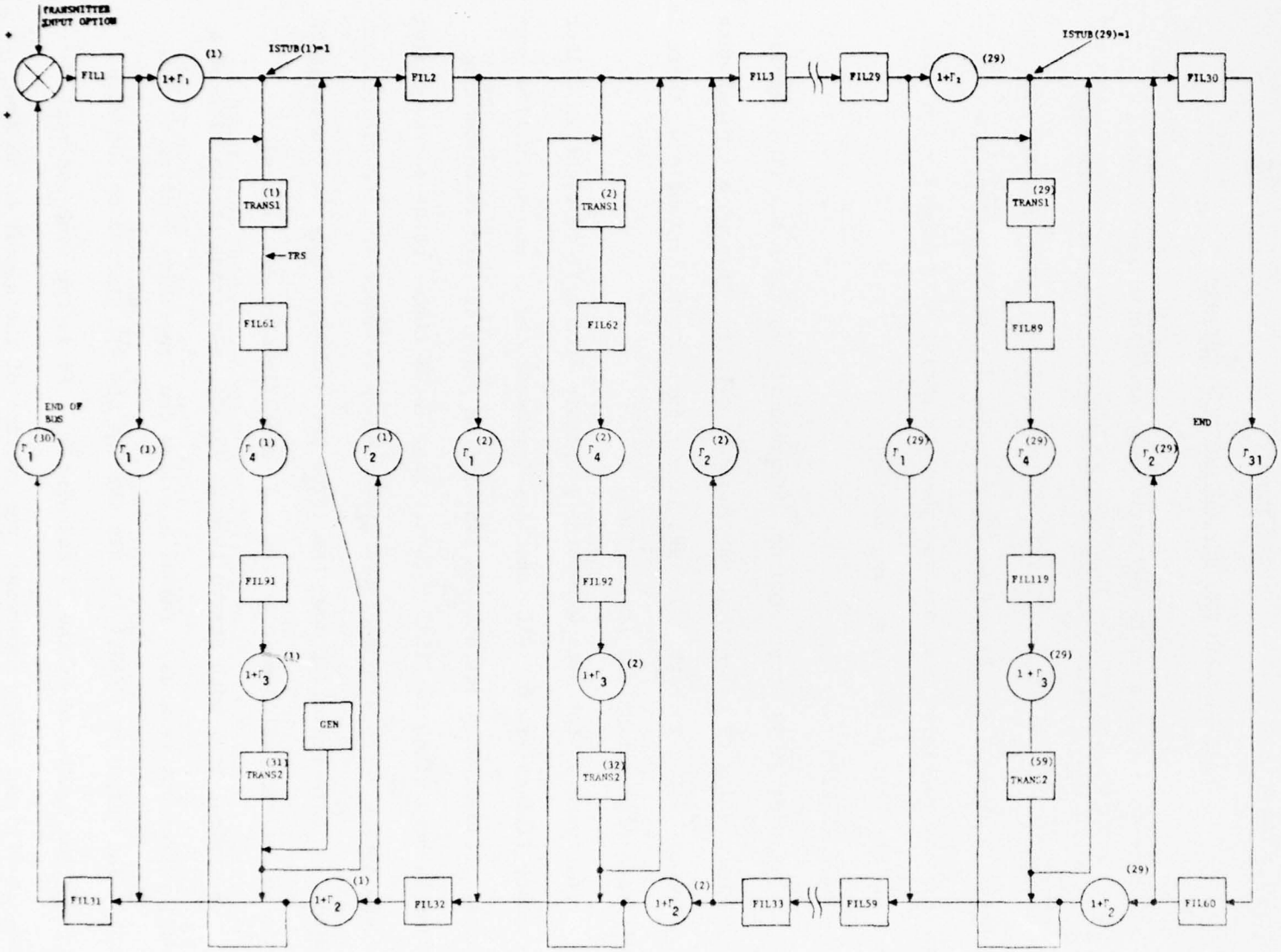


Figure 1. Signal Functional Flow

back toward the main bus. This reflection is passed through a FIL element and through TRANS2 which provides transfer characteristics from the stub to bus.

This program is organized to maintain signal "book-keeping" for each data bus location versus time and to call the various subroutines in proper sequence (Figure 2). Data transfer between routines is accomplished through COMMON.

Refer to Appendix A for the compiled listings of the main program plus subroutines.

a. Program MAIN

Program MAIN is the book-keeping program associated with maintaining the initial conditions and subsequent values of program variables, sequencing of subroutines and output media. Refer to Figure 3 for the flow chart for this program.

The user is given the option of output media when first entering this program. The input data is read and an LPT file is created. The VSWR is calculated by using the impedance of the load and the characteristic impedance of the bus, the VSWR, is defined by R(I,4), which is the instantaneous impedance seen at any junction. The transformer characteristics (WNSQ1, TWOZW1 and GAIN1) are modeled using the transfer functions of the combined transformer and stub load. The plotter is initialized by the statement CALL PLOTER (PLT,1). The points to be plotted are stored in the array FIL (N,2,K). The CALL FILTER statement passes this array to FILTER for difference equation calculations. The final decision point in this program is a reentry into the program, if desired.

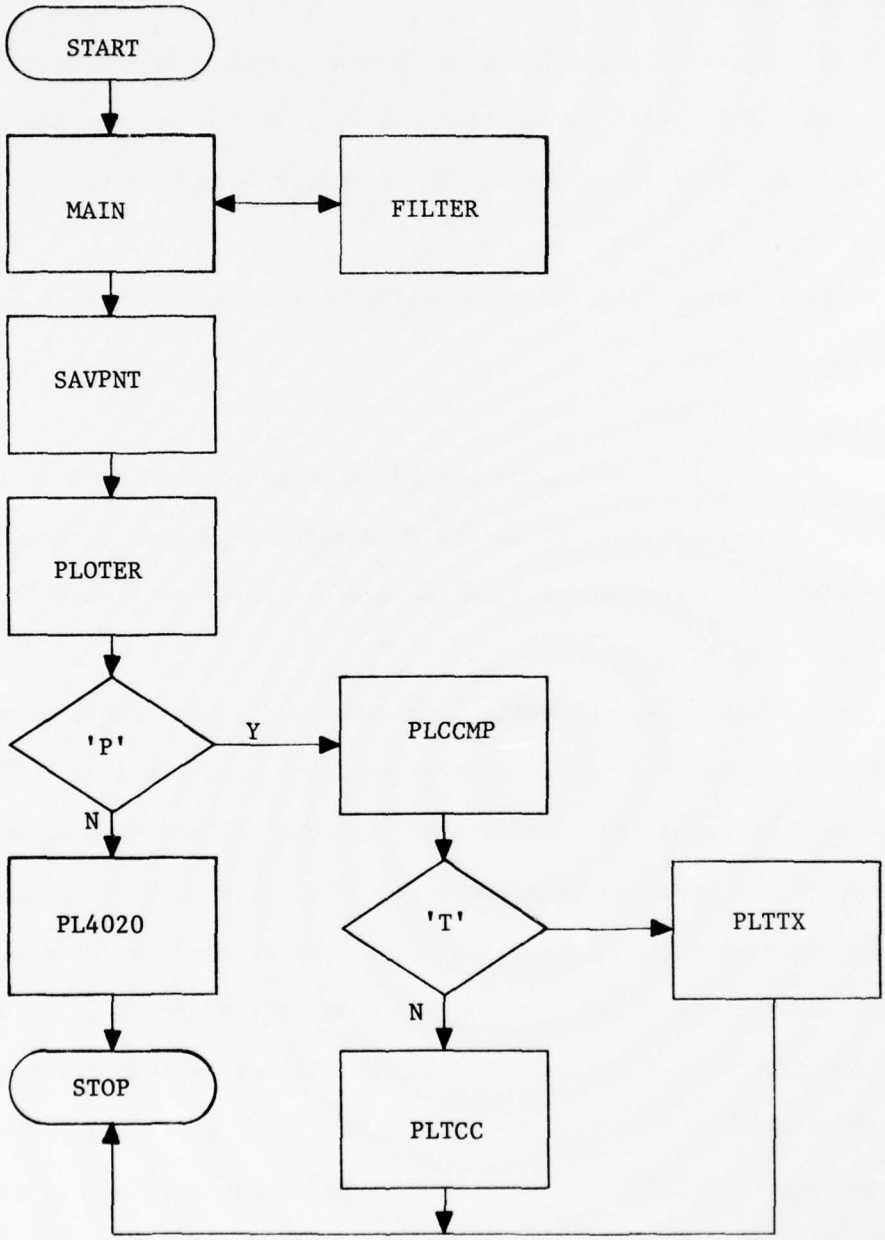


Figure 2 Program DBNS Flow Chart

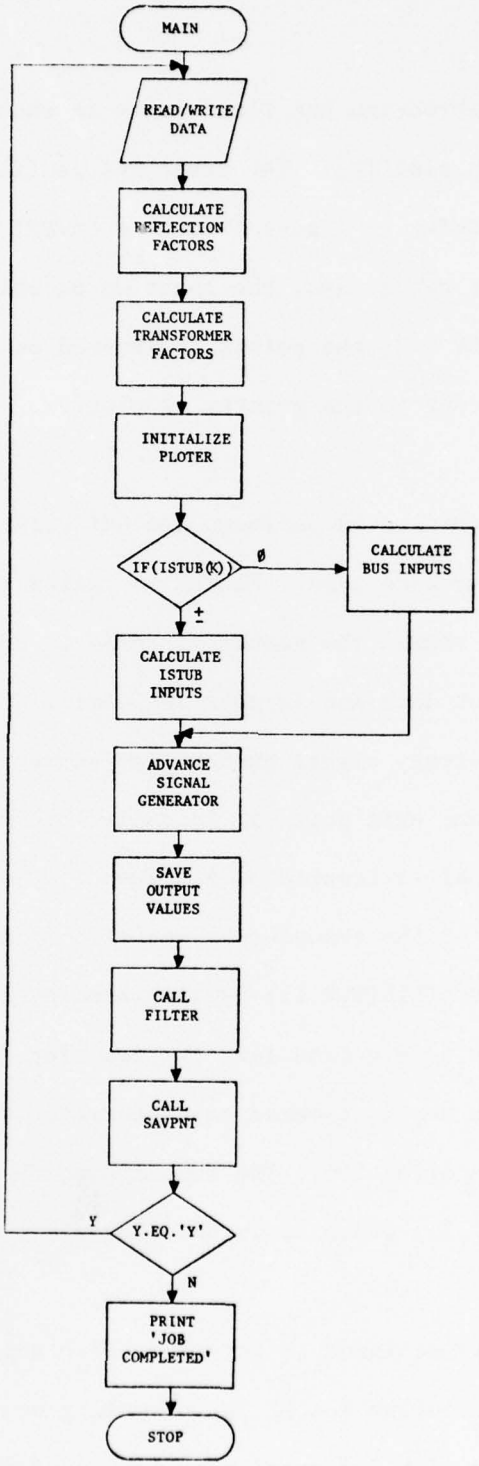


Figure 3. Program MAIN Flowchart

b. Subroutine SAVPNT

The SAVPNT (KEY) subroutine has flexibility in choosing bus location values to save for plotting. The array PLT is filled with the variables to be plotted. Refer to Figure 4 for the SAVPNT flow chart. The PLT array is the sum of two arrays, the location of which is determined by the user. When KEY = 2, the points are stored on disk and when KEY = 3, the points are output to the printer or plotter.

c. Subroutine FILTER

Subroutine FILTER (Figure 5) performs the difference equation calculations necessary to advance time. FILTER is called 350 times, once for each increment of time. The number of calls is determined by CCMAX, which is in the input data and is user definable. The bus is simulated by impressing an arbitrary signal onto a line segment. This subroutine has one entry and one exit point it is called by and returned to by program MAIN. This signal is treated as a sequence of small step functions. The simulation of the transformer and stub from bus to stub (FIL(L,2,1)) and stub to bus (FIL(M,2,1)) is simulated by a transformer with a capacitive load. In this subroutine, the transfer of energy (reflections) back to the main bus is treated as a generator driving the transformer in the opposite direction. The function which defines this energy transfer is TRS (I,1,1), which is in the discrete time domain.

d. Subroutine PLOTER

Subroutine PLOTER is designed to interface with subroutine PL4020, a line printer plot, or subroutine PLCCMP, a Cal-Comp plot routine. This subroutine must be supplied with information in tabular form on what vari-

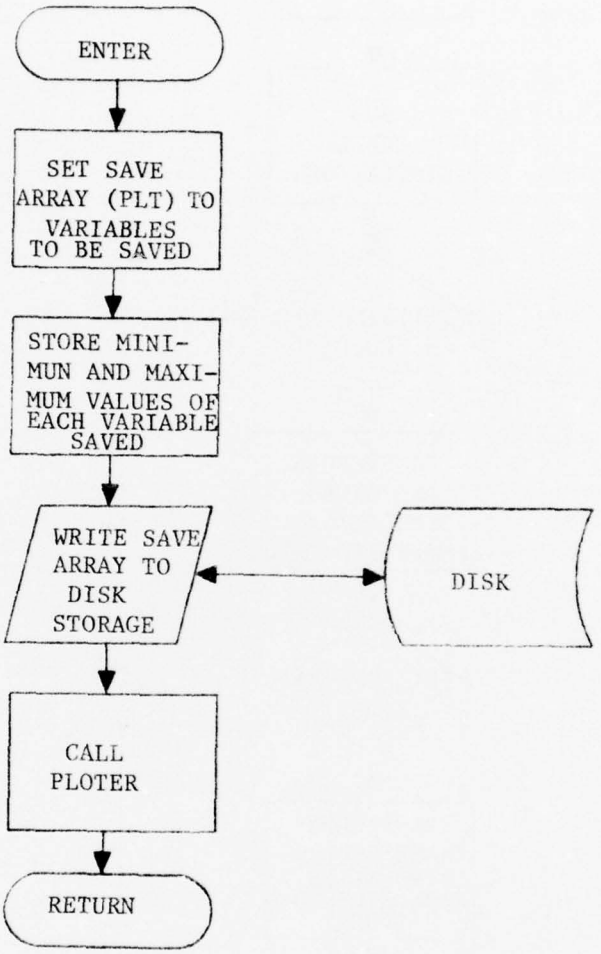


Figure 4. SAVPNT

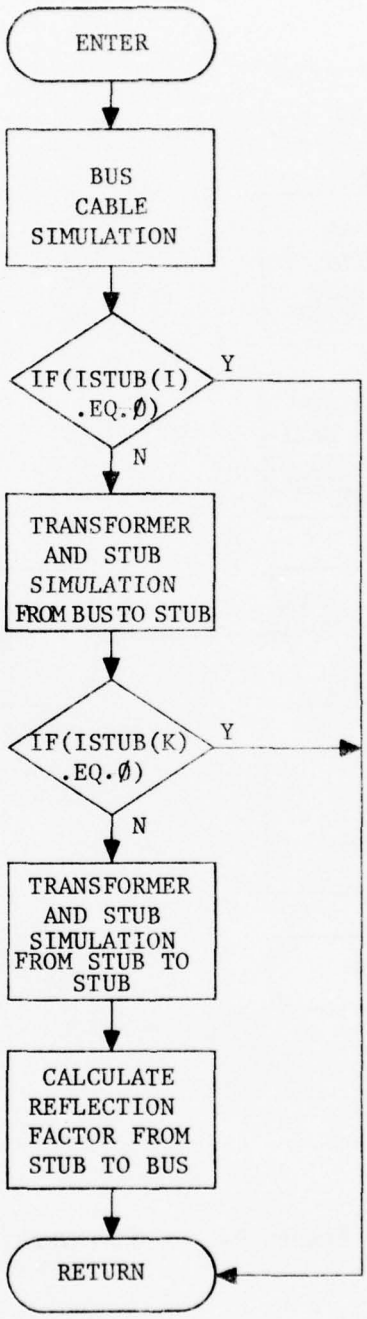


Figure 5. Subroutine FILTER Flow Chart

ables are to be plotted and/or printed. There are no output parameters returned from this subroutine. The output of the routine will be the requested plots. There are three logic paths depending upon the value of the parameter KEY (Figures 6, 7, and 8). When KEY = 1, PLOTER reads the input control cards, identification frame card and the individual frame label cards. When KEY = 2, the points of interest are stored on disk. The minimum and maximum values are stored in arrays XYMIN(I) and XYMAX(I) respectively. When KEY = 4 on the first logic pass, the identification frame is printed or plotted (the second successive pass passes to the plotter or printer driver, the points of interest to be plotted). After all plots have been output, an end of file is encountered, and the FORØ1.DAT file is closed. This file closure is initiated by the CLOSE statement.

e. Subroutine PL4020

This subroutine is designed to generate X-Y rectangular plots on a 132 column, high speed printer. This subroutine is initialized by a call to ENTRY PLOTID (HEADER) where HEADER is the starting location of the 72 character label for the ID frame. Termination is called by ENTRY PLTEND. This outputs the final graph. A plot is output each time a call is made to PL4020 when NPLOT is equal to 1.

This subroutine is called from subroutine PLOTER by CALL PL4020 (NPLOT, NCHAR, NP, X, Y, XMIN, XMAX, YMIN, YMAX, XLABEL, YLABEL, HEADER, CODE) where:

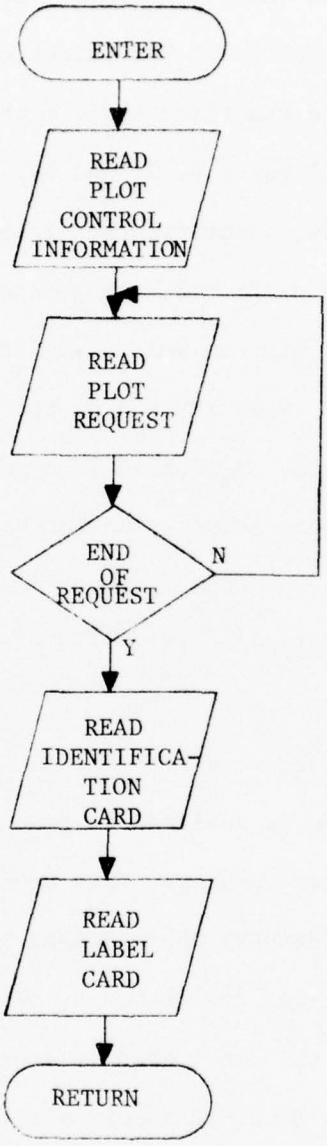


Figure 6. Subroutine PLOTER (KEY = 1)

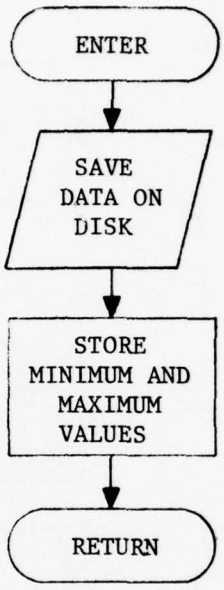


Figure 7. Subroutine PLOTER (KEY = 2)

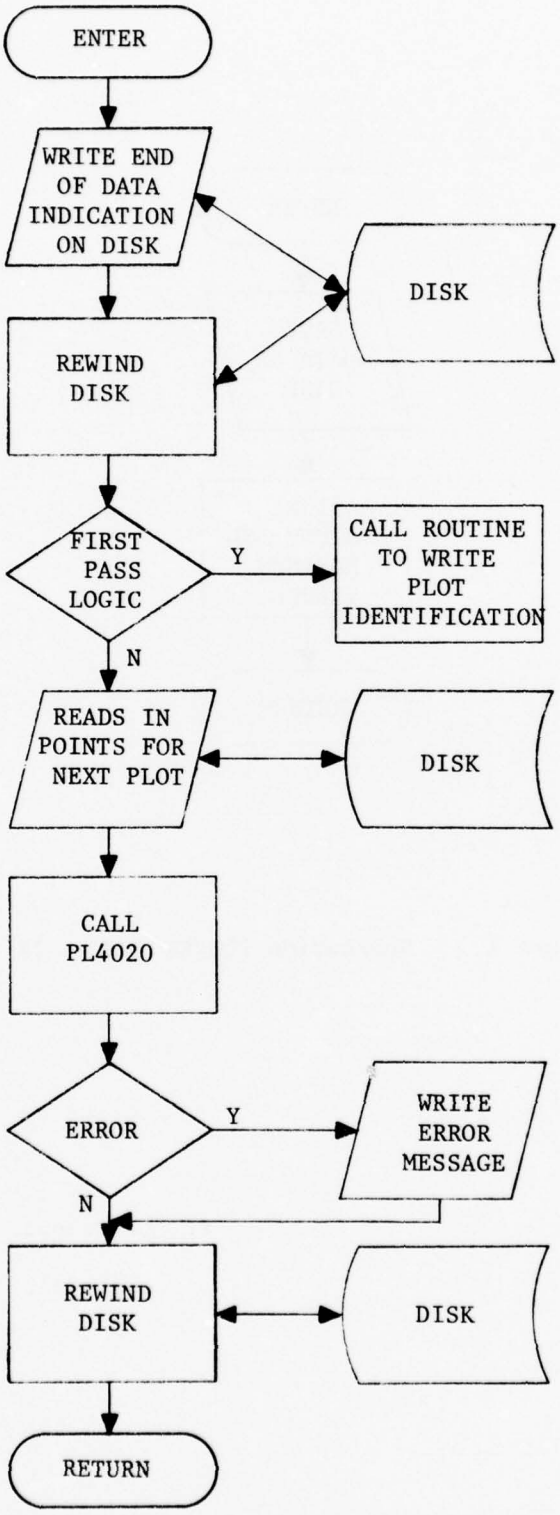


Figure 8. Subroutine PLOTER (KEY = 4)

NPLOT	determines the number of curves per grid. NPLOT = 1 will advance the frame.
NCHAR	this integer selects the plot symbol to be used. Refer to Table 1, a list of decimal modes.
NP	the number of points to be plotted.
X,Y	are the names of the arrays containing the X and Y coordinates respectively.
XMIN,XMAX	the minimum and maximum values for the X coordinates.
YMIN,YMAX	minimum and maximum values for the Y coordinates.
XLABEL,YLABEL	BCD labels for the X and Y axes, a maximum of 72 characters.
HEADER	location of 72 characters to be printed as heading for each frame.
CODE	this parameter is set by the subroutine to indicate an error condition:
	CODE = 1 normal return.
	CODE = 2 subroutine unable to construct readable grid.
	CODE = 3 off-scale plot points were encountered.

NOTE: CODE should initially be set to zero.

TABLE 1

DECIMAL CODES

DEC CODE	SYMBOL	DEC CODE	SYMBOL
00		32	Minus
01	1	33	J
02	2	34	K
03	3	35	L
04	4	36	M
05	5	37	N
06	6	38	O
07	7	39	P
08	8	40	Q
09	9	41	R
10	∂	42	O
11	=	43	$
12	"	44	*
13	'	45	Y
14	δ	46	∿
15	α	47	d(Differential)
16	+	48	Blank
17	A	49	/
18	B	50	S
19	C	51	T
20	D	52	U
21	E	53	V
22	F	54	W
23	G	55	X
24	H	56	Y
25	I	57	Z
26	II	58	°degree
27	•	59	'
28	)	60	(
29	β	61	ξ
30	+	62	
31	?	63	
		80	Zero

The flow charts for the PL4020 subroutine entry points are shown in Figure 9, 10, and 11. This subroutine does the actual plotting of the labels, axes and the points on the line printer. If a plot is available, the plot is output to the line printer, than the array is blanked out. The identification frame is output by a call to PLOTID, the array is then cleared. The last graph is output by PLTEND, then this array is cleared.

f. Subroutine PLCCMP

This subroutine (Figure 12) is designed to generate X-Y plots on a Cal-Comp plotter or a Tektronix CRT. This routine is called from PLOTER by CALL PLCCMP (NPLOT, NP, X, Y, XMIN, XMAX, YMIN, YMAX, XLABEL, YLABEL, HEADER, CODE) where:

NPLOT	determines the number of curves per grid. The frame will advance in NPLOT = 1.
NP	the number of points to be plotted.
X,Y	are the names of the arrays containing the X and Y coordinates respectively.
XMIN,XMAX	the minimum and maximum values for the X coordinates.
YMIN,YMAX	minimum and maximum values for the Y coordinates.
XLABEL,YLABEL	BCD labels for the X and Y axes, a maximum of 72 characters.
HEADER	location of 72 characters to be printed as heading for each frame.
CODE	this parameter is set by the subroutine to indicate an error condition:

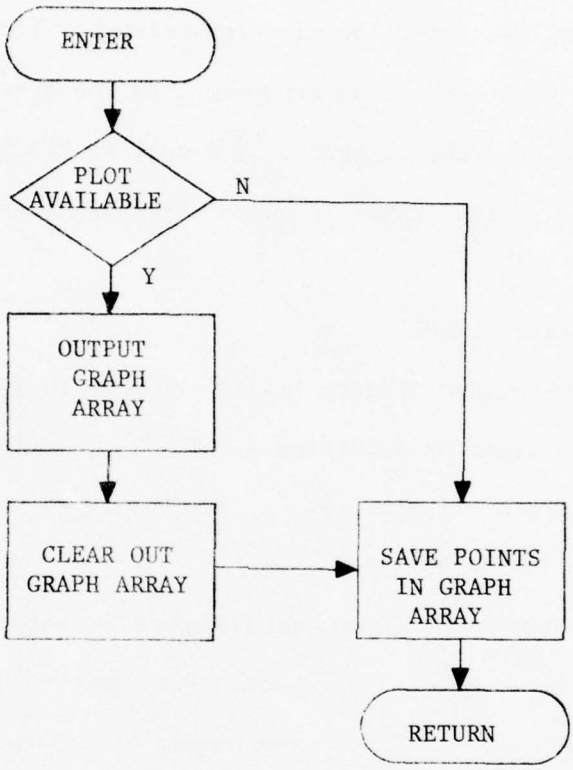


Figure 9. Subroutine PL4020 Flow Chart

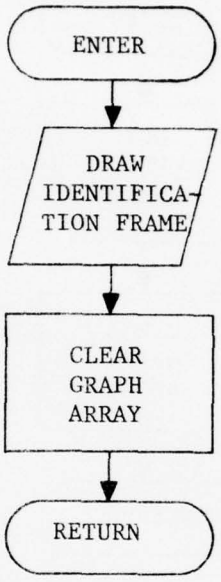


Figure 10. PLOTID Flow Chart

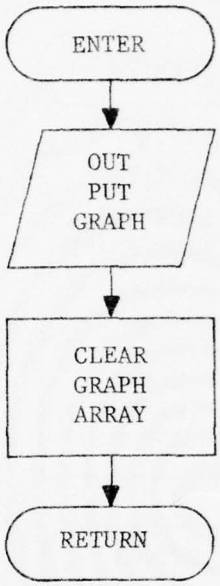


Figure 11. PLTEND Flow Chart

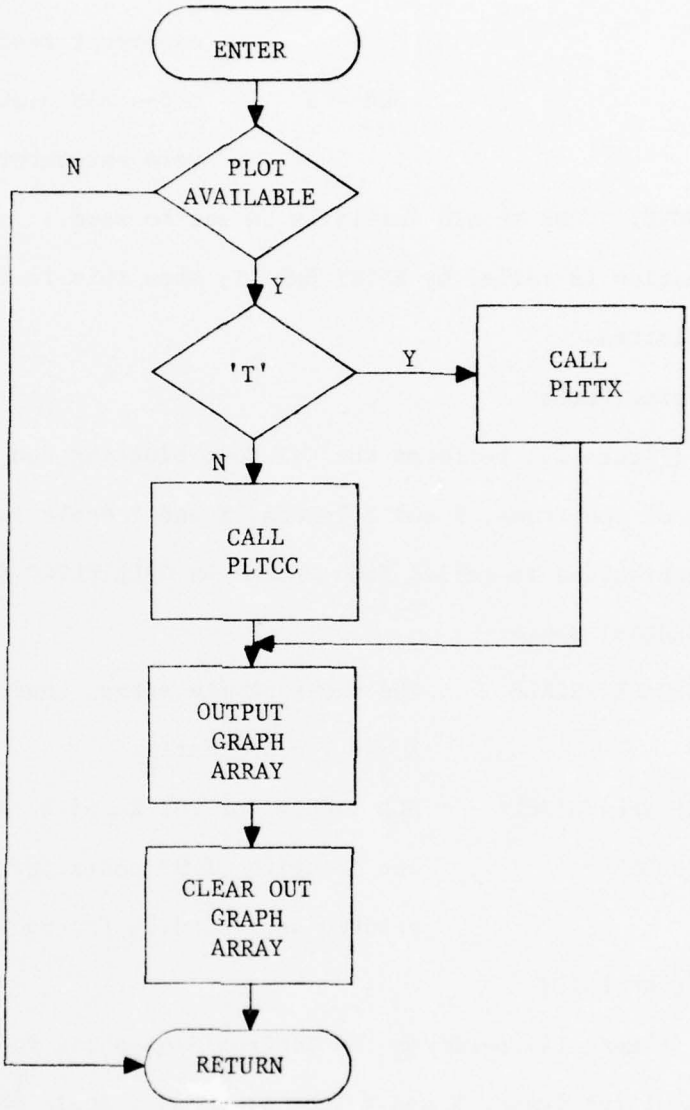


Figure 12. Subroutine PLCCMP Flow Chart

CODE = 1	normal return.
CODE = 2	subroutine unable to construct readable grid.
CODE = 3	off-scale plot points were encountered

NOTE: CODE should initially be set to zero.

The termination is called by ENTRY ENDPLT; when this is called, the final plot is plotted.

g. Subroutine PLTCC

PLTCC (Figure 13) performs the Cal-Comp plotting function. Its output consists of the frame, X and Y labels, X and Y scale values and the header. This subroutine is called from PLCCMP by CALL PLTCC (XSCALE,YSCALE, XLABEL,YLABEL,GRDLAB) where:

XSCALE,YSCALE	the names of the arrays containing the X and Y coordinates.
XLABEL,YLABEL	BCD labels for the X and Y axes.
GRDLAB	the location of 72 characters to be printed as a heading for each frame.

h. Subroutine PLTTX

PLTTX (Figure 14) performs the Tektronix graphing functions. Its output consists of the frame, X and Y labels, X and Y scale values and the header. This routine is called from PLCCMP once for each plot by CALL PLTTX (XSCALE,YSCALE,XLABEL,YLABEL,GRDLAB) where:

XSCALE,YSCALE	the names of the arrays containing the X and Y coordinates
XLABEL,YLABEL	BCD labels for the X and Y axes.
GRDLAB	the location of 72 characters to be plotted as a heading for each frame.

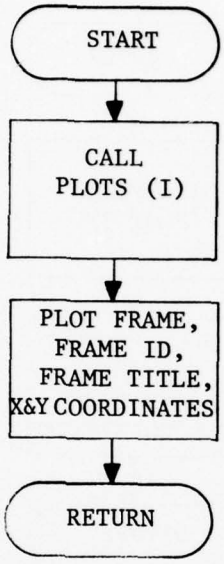


Figure 13. Subroutine PLTCC

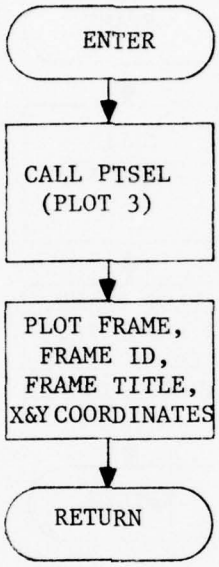


Figure 14. Subroutine PLTTX

The function CALL PLTSEL (PLOT3) is unique to the DEC-10 system. A listing of this function is not available. This call converts a properly scaled Cal-Comp plot routine to a plot which can be displayed on any Tektronix terminal.

SECTION III

OPERATIONAL DESCRIPTION

This program is resident on the AFAL owned DEC System-10. The program is written in FORTRAN-10, the DEC version of FORTRAN-4. If the user does not have a DEC System-10, several modifications will have to be made to the program. The open and close statements plus PLOT3 and PLTSEL (PLOT3) will need to be replaced. If a DEC system-10 is available, the only changes to be made are to replace PLOT3 and PLTSEL (PLOT3); these functions are for a Tektronix display of the output, and are unique to the AFAL DEC System-10.

This program is interactive, giving the user a choice of output media: line printer, Cal-Comp or Tektronix display/hard copy.

With minor program and data changes, this program should be able to simulate other types of transmission media.

1. GENERAL

This program is divided into essentially three sections: a book-keeping function, difference equation calculations and output. The first section consists of MAIN and SAVPNT, the second is FILTER and the third consists of PLOTER,PL4020,PLCCMP,PLTCC and PLTTX. In addition, there is a data file which must be named and defined in the open statement in MAIN. Refer to Figure 15 for the program deck layout.

2. PROGRAM USAGE

The program and data deck are best entered via card reader, or copied from another user's file. When the program is in execution, it will wait for inputs from the user's console. The program will output to the console the statement, PLEASE ENTER OUTPUT MEDIA; the user can enter P for the Cal-Comp/ Tektronix ploter, L for the line printer or B for both, then a carriage return. If P or B has been entered, there will be another output from the

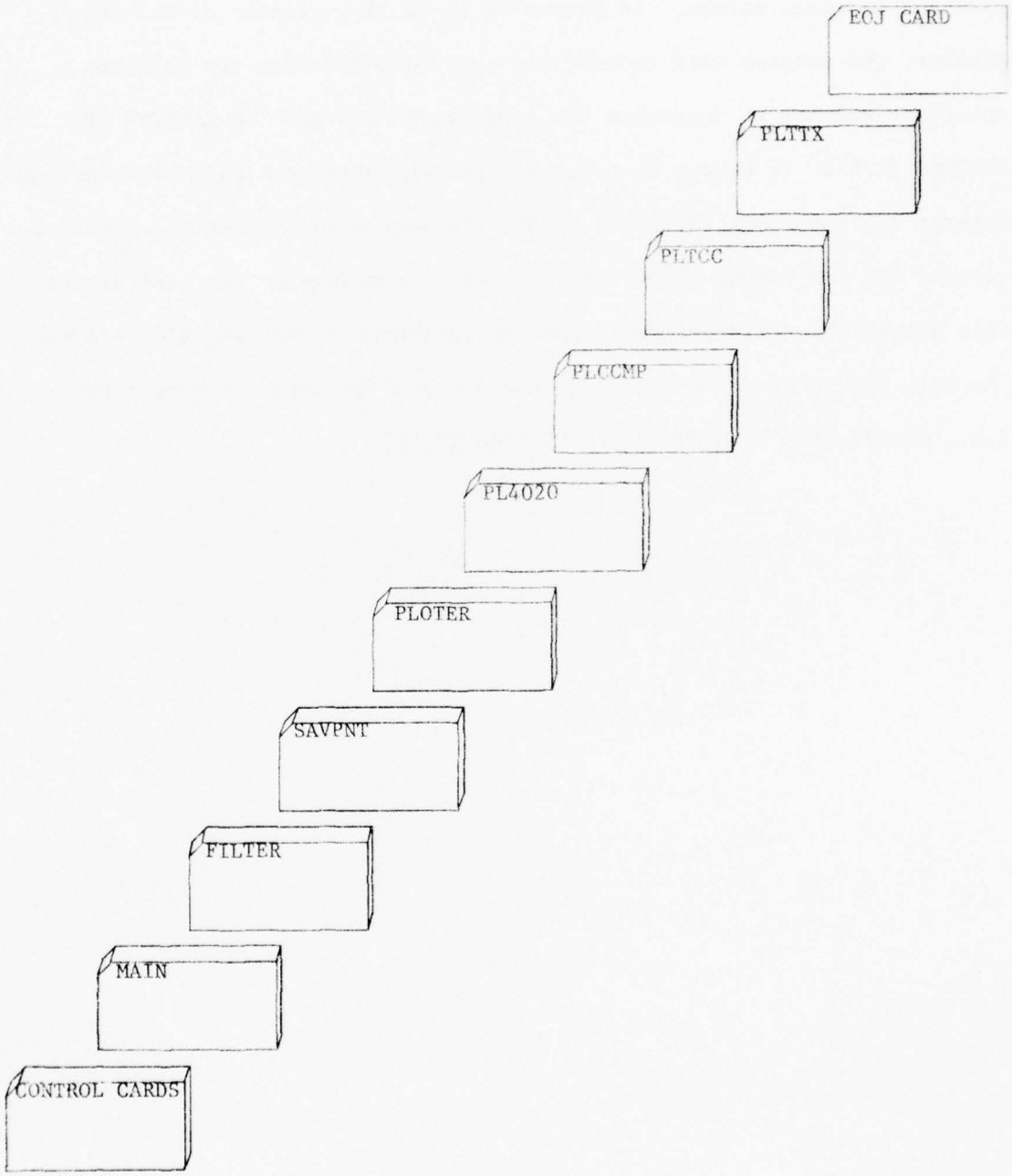


Figure 15. Program DBNS - Deck Layout

program, DO YOU WANT A TEKTRONIX (T) OR A CAL-COMP (C) PLOT? Enter a C or T and carriage return. If output is to be line printer or Cal-Comp plotter, the program will require one more response from the user to determine whether to terminate the program, DO YOU WISH TO REENTER THE PROGRAM (Y/N)? If output is to go to the Tektronix terminal, two carriage returns are required; the first clears the screen and allows the screen to recover and the second allows the program to continue to the next executable statement. This procedure must be continued after each plot. After the last plot, before terminating, the program requests one more input, i.e., DO YOU WISH TO REENTER THE PROGRAM (Y/N)?

SECTION IV

INPUT DATA

The program acquires the data from the OPEN statement in MAIN. The file name is the argument of FILE in the OPEN statement. This argument can be changed by the user to reflect a modified data file.

The input data consists of two sections; the first consists of sufficient data to characterize the data bus components and configuration. The second contains the plot control variables and variable labels. The data input is accomplished by using the FORTRAN NAMELIST statement. Refer to Figure 16 for the data deck configuration and Appendix B for a listing of the data decks used in this program.

1. COMPONENT AND CONFIGURATION DATA, SECTION I

The input data shown in Table 2 is sufficient to characterize the data bus components and configurations.

The following are program variable definitions and functional groupings. Impedances are in ohms, and time is in seconds.

SECT	This group defines transmission line dimensions and parameters.
T	Sample data period or computation angle time. It is set equal to the transport delay of a section of line on the main bus.
CCMAX	The number of computation cycles to terminate a run. This is generally determined by the length of time desired for display consistent with plotter capability.
ZX	The stub isolation resistance.
LENGT	The length of segments modeled. This entry signifies the total number of segments (120) times the length of each in feet (10).

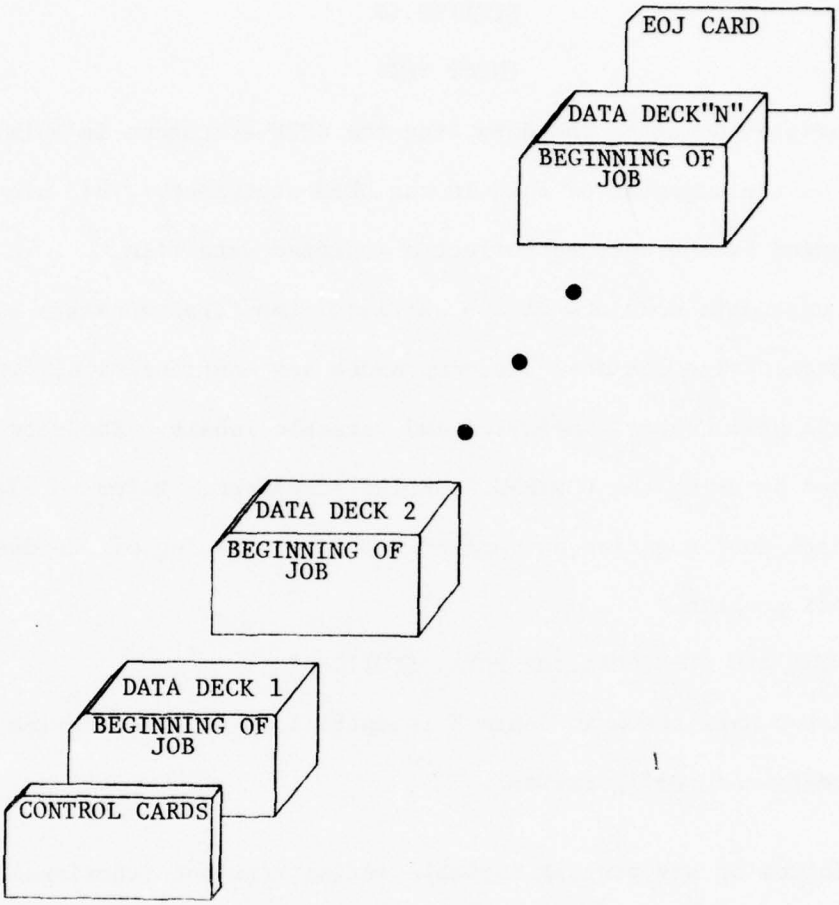


Figure 16 Data Deck Configuration

TABLE 2

COMPONENT AND CONFIGURATION DATA

```
BEGINNING OF JOB
 &SECT
T=13.3E-9,CCMAX=350,ZX=112.,LENGT=120*10,K250=0.892,K1500=0.9357
 ALPHA=.0085,R(30,4)=0.0,R(31,4)=0.0,Z0=68.,ZL=31*2200.
 &END
 &TRAN1
GAIN1=0.26767,WNSQ1=4.953E14,TWOZW1=8E6
 &END
 &TRAN2
 GAIN2=0.247218,ROOT2=2E7
 &END
 &GENXFR
GAIN3=0.38,POLE=8.9E6,REF1=-.066
 &END
 &STUB
 NPSKIP=2,
 ISTUB=31*0
 LSTUB=31*0
 &END
 &GENER
GENMAX=1.0,TSLOPE=50.E-9,NCCIN=115,NCCF=38,IGEN=0,ZG=68
 &END
 &SKIN
 GI1=.973,GI2=.0079,GI3=.0060858
 &END
```

K250 The relative output voltage to input voltage of 100 feet of cable terminated in Z0 to a step input after 250ns.

K1500 The relative output voltage to input voltage of 100 feet of cable after 1500ns.

ALPHA Line attenuation in db per foot at one megahertz.

R(30,4) The reflection coefficient at the left end of the main bus.

R(31,4) The reflection coefficient at the right end of the main bus.

ZO The characteristic impedance of the cable.

ZL The impedance of a stub termination. This is an array that permits different inputs at each termination.

TRAN1 This group defines characteristics of couplers as viewed from the bus.

GAIN1 A gain factor

WNSQ1 The natural frequency of oscillation squared.

TWOZW1 The transformer modeling term.

TRAN2 This group defines characteristics for transferring reflected energy back to the main bus when a stub does not contain the generator.

GAIN 2 A gain factor

ROOT 2 The Rt/L terms

GENXFR This group generally defines transformer characteristics for transmitting from a stub.

GAIN3 A gain factor similar to GAIN2.

POLE An R/L term similar to ROOT2.

REF1 Γ_1, the reflection coefficient introduced at each stub location.

STUB These are for data bus and plot configuration control.

NPSKIP This entry permits fewer plotting points than normal. Resolution is compromised for viewing a longer time base. The sample of NPSKIP = 2 means every other point is printed.

ISTUB An array that defines the number of stubs at each of the 29 main bus locations. An entry of 2 means two parallel stubs at a given location.

LSTUB An array that defines the length of stubs at each of the 29 stub locations. For example, Ø indicates no stubs and 3 indicates 3 stubs.

GENER The characteristics of the generator are in this group.

GENMAX This entry defines the output voltage of the generator.

TSLOPE The rise and fall times of the generator signal as defined by a signal from zero volts to GENMAX.

NCCIN The number of computation angles in each half of a synchronization waveform which always appears as a positive followed by a negative level of equal pulse width.

NCCF The number of computation angles in each bi-phase data pulse that follows the second half of a synchronization signal.

IGEN The location of the generator.

Ø = main bus, left end;

1 = stub location one;

2 = stub location two;

etc.

ZG The source impedance of the generator.

SKIN This group provides the entries for calculations related to complimentary error functions.

GI1,GI2,GI3 These values are best derived from the equations and information supplied in the IBM document AFAL-TR-75-209.

a. Array Inputs

Several of the inputs described previously are arrays. An array consists of "N" consecutive inputs of the same type. For example, ISTUB defines the location and number of stubs at each of the 29 possible locations along the main bus. This input can be introduced as twenty-nine consecutive integers such as follows:

Ø,Ø,Ø,1,Ø,1,Ø . . . (29 entries)

An array can also be introduced by an abbreviated method such as:

2,Ø,Ø,2Ø*Ø,Ø,2,3*Ø

where 2Ø*Ø and 3*Ø indicate 20 and 3 consecutive locations having no stubs.

2. PLOT CONTROL, VARIABLES AND VARIABLE LABELS; SECTION II

The remaining (Table 3) input cards contain information required to obtain a plot of one or more program variables, using the plot packages available.

TABLE 3

PLOT CONTROL AND VARIABLE DATA

```
24240101
0101 0 0  0102 0 0  0103 0 0  0104 0 0  0105 0 0  0106 0 0  0107 0 0  0108 0 0
0109 0 0  0110 0 0  0111 0 0  0112 0 0  0113 0 0  0114 0 0  0115 0 0  0116 0 0
0117 0 0  0118 0 0  0119 0 0  0120 0 0  0121 0 0  0122 0 0  0123 0 0  0124 0 0
    DATA BUS SIMULATOR 68 OHM TWISTED SHIELDED PAIR
CASE NUMBER 1
   TIME IN SEC
   TOTAL INPUT
   TOTAL OUTPUT
   FIL(2)
   FIL(3)
   STUB(3)
   FIL(4)
   STUB(4)
   FIL(6)
   STUB(6)
   FIL(8)
   STUB(8)
   FIL(10)
   STUB(10)
   FIL(12)
   FIL(22)
   STUB(22)
   FIL(24)
   STUB(24)
   FIL(26)
   STUB(26)
   FIL(28)
   STUB(28)
   GENERATOR
```

Control Card - one card

Columns 1-2: The number of variables - 25 or less. For consistancy, it should coincide with the dimension of array PLT in subroutine SAVPNT.

Columns 3-4: The number of plots requested. This number should be the same as the number of variables.

Columns 5-6: The increment to determine the number of points to be plotted; i.e., 2 will cause every second data point to be plotted. This will default to 1 if the field is blank.

Columns 7-8: This is the FORTRAN unit number of the peripheral storage device. This will default to 1 if the field is blank.

Plot Requests - one to four cards

Columns 1-2: An integer valve which denotes a subscript in the PLT array containing the variables; i.e., Ø2 would denote PLT (2). This is the independent variable for the curve - abscissa.

Columns 3-4: An integer valve denoting a subscript in the PLT array of the dependent variable to be used for the curve - ordinate.

Column 5: Blank

Column 6: The mode of the grid. Mode = Ø; the grid will be linear for the dependent and independent variables.

Column 7: Blank

Column 8: Frame advance, when equal to Ø. The printer or plotter will advance to a new frame.

Column 9-10: A decimal value for the plot symbol. This is the symbol used to define the curve. Refer to Table 1 for the decimal values of the plot symbols. Unprintable characters will yield blanks when using the printer plots.

SECTION V

OUTPUT

Appendix C contains representative examples of the output of this program. These examples will be taken from the 7 cases defined in the data file. It is obvious that some bus network schemes are not workable. These problems are ringing, over/under shoot, loss of noise margin, rise/fall times, propagation delay and line attenuation. Again, the user is directed to the "Data Bus Network Simulation", AFAL-TR-75-209, for a detailed discussion of the problem in parameter generation and waveform interpretation.

REFERENCES

1) L. Balliet, J.W. Dalton, J.R. Earl, W.W. Scott, "Data Bus Network Simulation", AFAL-TR-75-209, March, 1976.

2) "DEC System-10" Fortran-10 Language Manual", Second Edition, Digital Equipment Corporation, January 1974.

APPENDIX A

COMPILED LISTINGS OF DBNS

```
00001   C  PROGRAM MAIN
00002   C  ELECTRICAL CHARACTERISTICS SIMULATION OF A MULTIPLEX BUS .
00003   C  DATA BUS NETWORK SIMULATOR (DBNS).
00004         REAL LENGT(120),K250,K1500
00005         DIMENSION TAU(120),PLG(120),ZL(31)
00006         DIMENSION C1F1(29),C1F2(29),C1F3(29),C1F4(29)
00007         COMMON /C1/GEN,Z0,FILP(30,1,3),SUM(30)
00008         COMMON /C2/G(120,7),LSTUB(31),T,TRP(33,1,5)
00009         COMMON /C3/FIL(120,2,5),R(31,4),FILK(4,120),TIME,DEL(120,2,5)
00010         COMMON /C4/ZFIL(120),XK(31),RP(31),ISTUB(31)
00011         COMMON /C5/C1F1,C1F2,C1F3,C1F4,C2F1,C2F2,C2F3
00012         COMMON /C6/FILL(120,2,5),TRS(60,1,5),CT1(30,3),CT2(60,3)
00013         COMMON /BLOCK1/IN,IOUT,OUTFLG
00014         COMMON /PLOTX/IDUMY(2),NCOL
00015   C  NAMELIST DATA IS SECTION I OF THE INPUT DATA DECK.
00016         NAMELIST /SECT/T,CCMAX,ZX,LENGT,K250,K1500,ALPHA,R,Z0,ZL
00017         NAMELIST /TRAN1/GAIN1,WNSQ1,TWOZW1
00018         NAMELIST /TRAN2/GAIN2,ROOT2
00019         NAMELIST /GENXFR/GAIN3,POLE,REF1
00020         NAMELIST /STUB/NPSKIP,ISTUB,LSTUB
00021         NAMELIST /GENER/GENMAX,TSLOPE,NCC1N,NCCF,IGEN,ZG
00022         NAMELIST /SKIN/GI1,GI2,GI3
00023         DATA IEND/'EOJ'/
00024         DATA PI/3.14159/
00025   C  THE ARGUMENT OF FILE IS THE FILE NAME OF THE INPUT DATA DECK.
00026      10 OPEN(UNIT = 2,FILE = 'INPUT.TXT',ACCESS = 'SEQIN',DEVICE = 'DSK')
00027   C  USER'S CHOICE OF OUTPUT MEDIA
00028         TYPE 20
00029      20 FORMAT(' PLEASE ENTER OUTPUT MEDIA; PLOTTER(P),LINE PRINTER(L)
00030        1 OR BOTH(B).')
00031      30 ACCEPT 40,OUTFLG
00032      40 FORMAT(A1)
00033         IF(OUTFLG.NE.'?')GOTO 60
00034         TYPE 50
00035      50 FORMAT(' P = PLOTER,L = LINE PRINTER,B = BOTH')
00036         GOTO 30
00037      60 IF(OUTFLG.EQ.'P')GOTO 80
00038         IF(OUTFLG.EQ.'L')GOTO 80
00039         IF(OUTFLG.EQ.'B')GOTO 80
00040         TYPE 70
00041      70 FORMAT(' YOU MUST ENTER A P,L,B OR ?')
00042      80 CONTINUE
00043         IN = 2
00044         IOUT = 3
00045   C  1 = DSK, 2 = CDR, 3 = LPT
00046   C  DETERMINATION OF END OF DATA
00047         READ(IN,90)ICNTL
00048      90 FORMAT(A4)
00049         IF(IEND.EQ.ICNTL)GOTO 370
00050         WRITE(IOUT,100)
00051     100 FORMAT('1NEW JOB BEGINNING')
00052         KKK = 1
00053         VOLT1 = 0.0
00054         IWRITE = 5
00055         DO 110 I = 1,29
00056     110 ISTUB(I) = 0.0
```

```
00057   C  PRINTING OF TRANSFORMER AND TRANSMISSION LINE CHARACTERISTICS.
00058         READ(IN,SECT)
00059         WRITE(IOUT,120)T,CCMAX,ZX,LENGT(1),K250,K1500,ALPHA,R(30,4)
00060        1,R(31,4),Z0,ZL(1)
00061     120 FORMAT('0SECT DATA',2X,F12.11,2X,F6.1,2X,F6.1,2X,F5.1,2X,
00062        16F9.5,2X,F8.3)
00063         READ(IN,TRAN1)
00064         WRITE(IOUT,TRAN1)
00065         READ(IN,TRAN2)
00066         WRITE(IOUT,TRAN2)
00067         READ(IN,GENXFR)
00068         WRITE(IOUT,GENXFR)
00069         READ(IN,STUB)
00070         WRITE(IOUT,STUB)
00071         READ(IN,GENER)
00072         WRITE(IOUT,GENER)
00073         READ(IN,SKIN)
00074         WRITE(IOUT,SKIN)
00075         DO 130 I = 1,31
00076         DO 130 J = 1,4
00077     130 R(I,J) = 0.0
00078   C  CALCULATE REFLECTION FACTORS
00079         DO 140 I = 1,29
00080         IF(ISTUB(I).LT.1)GOTO 140
00081         R(I,1) = REF1
00082         R(I,2) = REF1
00083         XK(I) = ISTUB(I)
00084         RP(I) = Z0/2.0
00085         R(I,4) = (ZL(I)-Z0)/(ZL(I)+Z0)
00086     140 CONTINUE
00087         DO 150 I = 1,120
00088         TT = T/LENGT(I)
00089         G(I,1) = GI1
00090         G(I,2) = GI2
00091         G(I,3) = GI3
00092         G(I,5) = G(I,1)+G(I,2)+G(I,3)
00093         G(I,6) = K250**(LENGT(I)/100.0)
00094         G(I,7) = K1500**(LENGT(I)/100.0)
00095         PLG(I) = ABS((G(I,7)-G(I,6))/(G(I,7)-G(I,5)))
00096         TAU(I) = -200E-9/ALOG(PLG(I))
00097     150 G(I,4) = 1-EXP(-TT*LENGT(I)/TAU(I))
00098         CONTINUE
00099         GEN = 0.0
00100         NCOL = 0
00101         IPFLAG = 1
00102         IFLAG = 0
00103         TIME = 0.0
00104         GEN1 = 0.0
00105         PLT = IN
00106         DGEN = GENMAX*T/TSLOPE
00107         DO 160 I = 1,60
00108         DO 160 K = 1,5
00109         TRS(I,1,K) = 0.0
00110         DO 160 J = 1,3
00111     160 CT2(I,J) = 0.0
00112         DO 170 I = 1,30
```

```
00113          SUM(I) = 0.0
00114          TRP(I,1,1) = 0.0
00115          TRP(I,1,3) = 0.0
00116          TRP(I,1,2) = 0.0
00117          FILP(I,1,2) = 0.0
00118          DO 170 J = 1,3
00119      170 CT1(I,J) = 0.0
00120          DO 180 I = 1,120
00121          ZFIL(I) = 0.0
00122          DO 180 J = 1,2
00123          DO 180 K = 1,5
00124          FILL(I,J,K) = 0.0
00125      180 FIL(I,J,K) = 0.0
00126          DO 190 I = 1,4
00127          DO 190 J = 1,120
00128      190 FILK(I,J) = 0.0
00129      C   DATA INPUT
00130      C   CALCULATE REFLECT COEFFICIENTS
00131      C   REFLECTION COEFFICIENT DEFINE
00132      C   R(FIL NO,COEF NO) FOR REFLECTION COEFFICIENTS
00133      C   TRANSFORMER DATA FROM BUS TO STUB
00134          T = T/2.0
00135          DO 220 I = 1,29
00136          IF(ISTUB(I).LT.1)GOTO 200
00137          XLENG = LENGT(1)
00138          DD1 = WNSQ1*XLENG/LSTUB(I)
00139          GOTO 210
00140      200 DD1 = WNSQ1
00141      210 DD2 = TWOZW1
00142          DD3 = 1.0
00143          DD4 = DD1*GAIN1
00144          C1F3(I) = DD3+T*DD2+T*T*DD1
00145          C1F2(I) = (2.0*DD1*T*T-2.0*DD3)/C1F3(I)
00146          C1F1(I) = (DD1*T*T-DD2*T+DD3)/C1F3(I)
00147          C1F4(I) = DD4*T*T/C1F3(I)
00148      220 CONTINUE
00149      C   TRANSFORMER DATA FROM STUB TO BUS
00150          C2F2 = 1.0+T*ROOT2
00151          C2F1 = (T*ROOT2-1.0)/C2F2
00152          C2F3 = GAIN2*ROOT2*T/C2F2
00153      C   FIRST ORDER SIMULATION FOR GEN FROM STUB
00154          C3F2 = 1+T*POLE
00155          C3F1 = (T*POLE-1)/C3F2
00156          C3F3 = GAIN3*T*POLE/C3F2
00157          T = T*2.0
00158      C   INITIALIZE PLOTER.
00159          CALL PLOTER(PLT,1)
00160      C   NX = GEN SIGN CHANGE CONTROL
00161          NX = -NCCIN
00162      C   IGEN = GEN INPUT TO FILTER NUMBER
00163      C   STUB CONFIGURATION SPECIFY
00164      C   STATUS DATA RECORD
00165      230 CONTINUE
00166          IWRITE = IWRITE + 1
00167          IF(IWRITE.LT.5)GOTO 240
00168          IWRITE = 0
```

```
00169   C  SAVE PAST INPUT VALUES
00170     240 CONTINUE
00171         DO 250 N = 1,120
00172         DO 250 I = 1,4
00173         M = 6-I
00174         K = M-1
00175     250 FIL(N,1,M) = FIL(N,1,K)
00176   C  CALCULATE FILTER INPUTS
00177   C  FIL(NO, 1 = INPUT , SAMPLE)
00178   C           2 = OUTPUT
00179         DO 280 I = 2,30
00180         K = I-1
00181         N = K+30
00182         M = K+60
00183         L = K+90
00184         J = I+30
00185         IF(ISTUB(K))270,260,270
00186     260 FIL(I,1,1) = FIL(K,2,1)
00187         FIL(N,1,1) = FIL(J,2,1)
00188         GOTO 280
00189   C  2-30
00190   C  FOR TRANSFORMERS DON'T NEED VOLTAGE DIVIDE
00191     270 DEL(I,1,1) = (FIL(K,2,1)-FIL(K,2,2))*(1+R(K,1))+(FIL(L,2,1)
00192        1-FIL(L,2,2))*ISTUB(K)+(FIL(J,2,1)-FIL(J,2,2))*R(K,2)
00193         FIL(I,1,1) = FIL(I,1,1)+DEL(I,1,1)
00194         DEL(N,1,1) = (FIL(J,2,1)-FIL(J,2,2))*(1+R(K,2))+(FIL(L,2,1)
00195        1-FIL(L,2,2))*ISTUB(K)+(FIL(K,2,1)-FIL(K,2,2))*R(K,1)
00196         FIL(N,1,1) = FIL(N,1,1)+DEL(N,1,1)
00197         DEL(M,1,1) = (FIL(K,2,1)-FIL(K,2,2))*(1+R(K,1))+(FIL(J,2,1)
00198        1-FIL(J,2,2))*(1+R(K,2))
00199         FIL(M,1,1) = FIL(M,1,1)+DEL(M,1,1)
00200     280 CONTINUE
00201         DEL(1,1,1) = (FIL(31,2,1)-FIL(31,2,2))*R(30,4)
00202         FIL(1,1,1) = FIL(1,1,1)+DEL(1,1,1)
00203         DEL(60,1,1) = (FIL(30,2,1)-FIL(30,2,2))*R(31,4)
00204         FIL(60,1,1) = FIL(60,1,1)+DEL(60,1,1)
00205   C  SIGNAL GENERATOR
00206         NX = NX+1
00207         IF(NX.NE.0)GOTO 300
00208         DGEN = -DGEN
00209         IF(IFLAG.GT.0)GOTO 290
00210         IFLAG = 1
00211         NX = -NCCIN
00212         GOTO 300
00213     290 NX = -NCCF
00214     300 CONTINUE
00215         GEN = GEN+DGEN
03216         IF(GEN.GE.GENMAX)GEN = GENMAX
00217         IF(GEN.LE.-GENMAX)GEN = -GENMAX
00218         IF(IGEN.LT.0)GOTO 330
00219         IF(IGEN.GE.1.AND.IGEN.LT.30)GOTO 310
00220         GOTO 320
00221     310 IGENI = IGEN+1
00222         IGENR = IGEN+30
00223         VOLT = C3F3*(GEN+GEN1)-C3F1*VOLT1
00224         FIL(IGENI,1,1) = FIL(IGENI,1,1)+VOLT-VOLT1
```

```
00225          FIL(IGENR,I,1) = FIL(IGENR,I,1)+VOLT-VOLT1
00226          VOLT1 = VOLT
00227          GOTO 330
00228      320 KGEN = IGEN+1
00229          FIL(KGEN,1,1) = FIL(KGEN,1,1)+GEN-GEN1
00230      330 GEN1 = GEN
00231    C  END OF GENERATOR
00232    C  PRINT OUTPUT
00233          K = 1
00234    C  SAVE OUTPUT VALUES
00235          DO 340 N = 1,120
00236          DO 340 I = 1,4
00237          M = 6-I
00238          K = M-1
00239      340 FIL(N,2,M) = FIL(N,2,K)
00240    C  ADVANCE ALL FILTERS
00241          CALL FILTER
00242    C  TIME OUT
00243          CONTINUE
00244          IPFLAG = IPFLAG-1
00245          IF(IPFLAG.GT.0)GOTO 350
00246          IPFLAG = NPSKIP
00247          CALL SAVPNT(2)
00248      350 TIME = TIME+T
00249          KKK = KKK+1
00250          IF(KKK-CCMAX)230,230,360
00251      360 CONTINUE
00252          CALL SAVPNT(3)
00253          GOTO 80
00254      370 CONTINUE
00255          ACCEPT 380
00256      380 FORMAT(A1)
00257          TYPE 390
00258      390 FORMAT(' DO YOU WISH TO REENTER THE PROGRAM (Y/N)?')
00259          ACCEPT 400,Y
00260      400 FORMAT(A1)
00261          IF(Y.EQ.'Y')GOTO 10
00262          WRITE(IOUT,410)
00263      410 FORMAT('1JOB COMPLETED')
00264          STOP
00265          END
```

COMMON BLOCKS

```
/C1/(+172)
GEN     +0      Z0      +1      FILP    +2      SUM     +134
/C2/(+2015)
G       +0      LSTUB   +1510
T       +1547   TRP     +1550
/C3/(+5675)
FIL     +0      R       +2260   FILK    +2454   TIME    +3414
DEL     +3415
/C4/(+325)
ZFIL    +0      XK      +170    RP      +227    ISTUB   +266
/C5/(+167)
```

```
C1F1    +0      C1F2    +35
C1F3    +72     C1F4    +127    C2F1    +164    C2F2    +165    C2F3    +166
/C6/(+3352)
FILL    +0
TRS     +2260   CT1     +2734   CT2     +3066
/BLOCK1/(+3)
IN      +0      IOUT    +1      OUTFLG  +2
/PLOTX/(+3)
IDUMY.  +0
NCOL    +2
```

SUBPROGRAMS CALLED

SAVPNT ALOG. PLOTER EXP. FILTER ABS.

SCALARS AND ARRAYS ["*" NO EXPLICIT DEFINITION - "%" NOT REFERENCED]

```
 .S0020 1       *GI1    2       TAU     3       *ZX     173     *ZG     174     *NPSKIP 175
*N      176     *PLT    177     *K      200     *DD2    201     *PI     202     *GEN1   203
*VOLT1  204     *ICNTL  205     *NX     206     *REF1   207     *ROOT2  210     *C3F3   211
 ZL     212     *IGEN   251     *GI2    252      LENGT  253     *Y      443     *C3F2   444
*IWRITE 445     *GENMAX 446     *TWOZW1 447      K250   450     *VOLT   451     *NNS01  452
*IGEN1  453     *DD3    454     *IPFLAG 455     *M      456     *J      457     *GAIN3  460
*KKK    461     *TSLOPE 462      PLG    463     *C3F1   653      .S0007 654      K1500  655
 .S0006 656      .S0005 657     *GI3    660     *KGEN   661      .S0004 662      .S0003 663
*CCMAX  664      .S0002 665      .S0001 666      .S0000 667     *IEND   670     *GAIN2  671
 .S0017 672     *NCCIN  673      .S0016 674     *DD4    675      .S0015 676     *IGENR  677
 .S0014 700     *POLE   701      .S0013 702      .S0012 703      .S0011 704      .S0010 705
*ALPHA  706     *L      707     *XLENG  710     *I      711     *TT     712     *GAIN1  713
*DD1    714     *NCCF   715      .S0024 716     *IFLAG  717      .S0023 720     *DGEN   721
 .S0022 722      .S0021 723
```

TEMPORARIES

```
*STUB   1026    *SECT   1027    *GENXFR 1030    *GENER  1031    *SKIN   1032    *TRAN1  1033
*TRAN2  1034     .Q0000 1035
```

```
TRS             12#     109#
TSLOPE          21#      71#     72      106
TT              88#      97
TWOZW1          17#      63#     64      141
VOLT           223#     224     225      226
VOLT1           53#     223     224      225     226#
WNSQ1           17#      63#     64      138     140
XK              10#      83#
XLENG          137#     138
Y              259#     261
Z0               7#      16#     58#     59      84      85
ZFIL            10#     121#
ZG              21#      71#     72
ZL               5#      16#     58#     59      85
ZX              16#      58#     59
100P            50       51#
10P             26#     261
110P            55       56#
120P            59       61#
130P            75       76      77#
140P            79       80      86#
150P            87       97#
160P           107      108     110     111#
170P           112      118     119#
180P           120      122     123     125#
190P           126      127     128#
200P           136      140#
20P             28       29#
210P           139      141#
220P           135      148#
230P           165#     250
240P           167      170#
250P           171      172     175#
260P           185      186#
270P           185      191#
280P           179      188     200#
290P           209      213#
300P           207      212     214#
30P             31#      36
310P           219      221#
320P           220      228#
330P           218      227     230#
340P           235      236     239#
350P           245      248#
360P           250      251#
370P            49      254#
380P           255      256#
390P           257      258#
400P           259      260#
40P             31       32#
410P           262      263#
50P             34       35#
60P             33       37#

70P             40       41#
80P             37       38      39      42#     253
90P             47       48#
MAIN.   [ NO ERRORS DETECTED ]
```

```
00001          SUBROUTINE SAVPNT(KEY)
00002    C  THIS ROUTINE SUMS THE VARIABLES FOR EACH PLOT DURING
00003    C  ONE TIME FRAME.
00004          REAL PLT(25)
00005          COMMON /C1/GEN,Z0,FILP(30,1,3),SUM(30)
00006          COMMON /C3/FIL(120,2,5),R(31,4),FILK(4,120),TIME,DEL(120,2,5)
00007          PLT(1) = TIME
00008          PLT(2) = FIL(1,1,1)+FIL(31,2,1)
00009          PLT(3) = FIL(30,2,1)+FIL(60,1,1)
00010          PLT(4) = FIL(2,2,1)+FIL(32,1,1)
00011          PLT(5) = FIL(3,2,1)+FIL(33,1,1)
00012          PLT(6) = FIL(63,2,1)+FIL(93,1,1)
00013          PLT(7) = FIL(4,2,1)+FIL(34,1,1)
00014          PLT(8) = FIL(64,2,1)+FIL(94,1,1)
00015          PLT(9) = FIL(6,2,1)+FIL(36,1,1)
00016          PLT(10) = FIL(66,2,1)+FIL(96,1,1)
00017          PLT(11) = FIL(8,2,1)+FIL(38,1,1)
00018          PLT(12) = FIL(68,2,1)+FIL(98,1,1)
00019          PLT(13) = FIL(10,2,1)+FIL(40,1,1)
00020          PLT(14) = FIL(70,2,1)+FIL(100,1,1)
00021          PLT(15) = FIL(12,2,1)+FIL(42,1,1)
00022          PLT(16) = FIL(22,2,1)+FIL(52,1,1)
00023          PLT(17) = FIL(82,2,1)+FIL(112,1,1)
00024          PLT(18) = FIL(24,2,1)+FIL(54,1,1)
00025          PLT(19) = FIL(84,2,1)+FIL(114,1,1)
00026          PLT(20) = FIL(26,2,1)+FIL(56,1,1)
00027          PLT(21) = FIL(86,2,1)+FIL(116,1,1)
00028          PLT(22) = FIL(28,2,1)+FIL(58,1,1)
00029          PLT(23) = FIL(88,2,1)+FIL(118,1,1)
00030          PLT(24) = GEN
00031          CALL PLOTER(PLT,KEY)
00032          RETURN
00033          END
```

COMMON BLOCKS

```
/C1/(+172)
GEN     +0      Z0      +1      FILP    +2      SUM     +134
/C3/(+5675)
FIL     +0      R       +2260
FILK    +2454   TIME    +3414   DEL     +3415
```

SUBPROGRAMS CALLED

PLOTER

SCALARS AND ARRAYS ("*" NO EXPLICIT DEFINITION - "%" NOT REFERENCED)

```
 PLT    1       *KEY    32
```

TEMPORARIES

 .SAV16 33

C1 5#
C3 6#
DEL 6#
FIL 6# 8 9 10 11 12 13 14 15 16 17 18 19 20
21 22 23 24 25 26 27 28 29
FILK 6#
FILP 5#
GEN 5# 30
KEY 1# 31 31#
PLOTER 31
PLT 4# 7# 8# 9# 10# 11# 12# 13# 14# 15# 16# 17# 18# 19#
20# 21# 22# 23# 24# 25# 26# 27# 28# 29# 30# 31 31#
R 6#
SAVPNT 1#
SUM 5#
TIME 6# 7
Z0 5#
SAVPNT [NO ERRORS DETECTED]

```
00001          SUBROUTINE PLOTER(PLT,KEY)
00002          DIMENSION BUFFRX(501),BUFFRY(501),GRDLAB(72),IDF(72),IX(40),
00003         1MODE(40),NCHAR(40),NFRM(40),PLT(40),XYAXIS(72,40),XYMAX(40),
00004         2XYMIN(40),IY(40)
00005          INTEGER ERR1,ERR2
00006    C  INITIALIZE AND READ IN CONTROL AND LABEL CARDS. THIS IS SECTION
00007    C  II OF THE INPUT DATA.
00008          COMMON /BLOCK1/IN,IOUT,OUTFLG
00009          COMMON /PLOTX/NVARS,LPLOT
00010          DATA IDOT/'.'/,IBLANK/' '/
00011          GOTO(10,120,140),KEY
00012       10 CONTINUE
00013    C  KEY = 1
00014    C  M IS SET TO THE INPUT UNIT NUMBER WHICH IS 2 FOR THE CDR.
00015          LPLOT = 1
00016          M = PLT(1)
00017          READ(M,20)NVARS,NPLOTS,NSKIP,NUNIT
00018       20 FORMAT(4I2)
00019          IF(OUTFLG.EQ.'P')GOTO 40
00020          WRITE(IOUT,30)NVARS,NPLOTS
00021       30 FORMAT(/,' PLOTER CALLED.',I3,' VARIABLES SPECIFIED.',I3,' PLOTS R
00022         1EQUESTED.')
00023       40 IF(NVARS.GT.0)GOTO 60
00024          WRITE(IOUT,50)
00025       50 FORMAT(' THE NUMBER OF VARIABLES REQUESTED BY PLOTER IS NOT GIVEN
00026         1.')
00027          STOP
00028       60 IF(NUNIT.LE.0)NUNIT = 1
00029    C  SET XYMIN TO LARGE NUMBER AND XYMAX TO SMALL VALUE.
00030          DO 70 I = 1,40
00031          XYMIN(I) = 1.E35
00032          XYMAX(I) = -1.E35
00033       70 CONTINUE
00034          REWIND NUNIT
00035    C  READ VARIABLES PLOT CONTROL CARD
00036          READ(M,80)(IX(I),IY(I),MODE(I),NFRM(I),NCHAR(I),I = 1,NPLOTS)
00037       80 FORMAT(8(I2,I2,I2,I2,A2))
00038          DO 90 I = 1,NPLOTS
00039          IF(NCHAR(I).EQ.IBLANK)NCHAR(I) = IDOT
00040          MODE(I) = MODE(I)+1
00041       90 NFRM(I) = NFRM(I)+1
00042    C  READ AXES LABELS CARDS
00043          READ(M,100)IDF
00044          READ(M,100)GRDLAB
00045          DO 110 I = 1,NVARS
00046          READ(M,100)(XYAXIS(K,I),K = 1,72)
00047      100 FORMAT(72A1)
00048      110 CONTINUE
00049          RETURN
00050    C THIS IS THE ENTRY FROM THE USER-COMPLETED FORTRAN ROUTINE. WRITE THE
00051    C POINTS ON DISK AND STORE MIN-MAX VALUES FOR EACH VARIABLE.
00052      120 DO 130 I = 1,NVARS
00053    C  KEY = 2
00054          XYMIN(I) = AMIN1(PLT(I),XYMIN(I))
00055          XYMAX(I) = AMAX1(PLT(I),XYMAX(I))
00056      130 CONTINUE
```

```
00057   C WRITE THE POINTS ON DISK
00058         WRITE(NUNIT)(PLT(I),I = 1,NVARS)
00059         RETURN
00060   C ALL THE POINTS HAVE BEEN WRITTEN. WRITE OUT AN EOF MARKER.
00061     140 CONTINUE
00062   C  KEY = 4
00063         PLT(1) = 1.E30
00064         WRITE(NUNIT)(PLT(I),I = 1,NVARS)
00065   C  REWIND NUNIT CLOSES THE FILE.
00066         REWIND NUNIT
00067         IF(OUTFLG.EQ.'P')GOTO 150
00068         CALL PLOTID(IDF,1,9)
00069     150 DO 180 I = 1,NPLOTS
00070         IF(NFRM(I)-2)180,160,180
00071     160 IF(NFRM(I-1)-2)170,180,170
00072     170 NFRM(I-1) = 3
00073     180 CONTINUE
00074   C READ IN THE POINTS FOR EACH PLOT
00075         DO 390 K = 1,NPLOTS
00076         IXX = IX(K)
00077         IYY = IY(K)
00078         IF(NFRM(K)-2)190,200,200
00079     190 XMIN = XYMIN(IXX)
00080         XMAX = XYMAX(IXX)
00081         YMIN = XYMIN(IYY)
00082         YMAX = XYMAX(IYY)
00083         GOTO 260
00084     200 IF(NFRM(K)-3)290,210,290
00085     210 XMIN = 1.E35
00086         XMAX = -1.E35
00087         YMIN = 1.E35
00088         YMAX = -1.E35
00089         NFRM(K) = 4
00090         DO 250 M = K,NPLOTS
00091         IF(NFRM(M)-2)290,240,220
00092     220 IF(NFRM(M)-4)290,230,230
00093     230 NFRM(M) = 1
00094     240 IIY = IY(M)
00095         IIX = IX(M)
00096         XMIN = AMIN1(XYMIN(IIX),XMIN)
00097         XMAX = AMAX1(XYMAX(IIX),XMAX)
00098         YMIN = AMIN1(XYMIN(IIY),YMIN)
00099         YMAX = AMAX1(XYMAX(IIY),YMAX)
00100     250 CONTINUE
00101         GOTO 290
00102     260 IF(XYMIN(IXX)-XYMAX(IXX))270,290,270
00103     270 IF(XYMIN(IYY)-XYMAX(IYY))290,280,290
00104     280 IF(OUTFLG.EQ.'P')GOTO 390
00105         ERR1 = K
00106         GOTO 390
00107     290 INC = 1
00108         IF(ERR2.EQ.0)GOTO 310
00109         WRITE(IOUT,300)ERR2
00110     300 FORMAT('1THE MINIMUM-MAXIMUM VALUES FOR THE VARIABLES IN CURVE',
00111        1I3,' ARE EQUAL')
00112     310 ERR2 = ERR1
```

```
PLOTER  SIM05.FOR       FORTRAN V.4A(317) /KI/C 31-JAN-77       8:41    PAGE 1-2
00113          ERR1 = 0
00114          DO 330 J = 1,501
00115          READ(NUNIT)(PLT(I),I = 1,NVARS)
00116          IF(PLT(1)-1.E30)320,340,320
00117      320 BUFFRX(J) = PLT(IXX)
00118          BUFFRY(J) = PLT(IYY)
00119          INC = INC+1
00120      330 CONTINUE
00121      340 J = J-1
00122          IF(OUTFLG.EQ.'L')GOTO 350
00123      C  CALL TO PLOTTER(CAL-COMP/TEKTRONIX).
00124          CALL PLCCMP(NFRM(K),J,BUFFRX,BUFFRY,XMIN,XMAX,YMIN,YMAX,
00125         1XYAXIS(1,IXX),XYAXIS(1,IYY),GRDLAB,IERR)
00126          IF(OUTFLG.EQ.'P')GOTO 360
00127      C  CALL TO LINE PRINTER.
00128      350 CALL PL4020(NFRM(K),NCHAR(K),J,BUFFRX,BUFFRY,XMIN,XMAX,YMIN,
00129         1YMAX,XYAXIS(1,IXX),XYAXIS(1,IYY),GRDLAB,IERR)
00130      360 IF(IERR.EQ.1)GOTO 380
00131          WRITE(IOUT,370)IERR
00132      370 FORMAT(' GRAPH FAILED ',I3) .
00133      380 REWIND NUNIT
00134      390 CONTINUE
00135          IF(OUTFLG.EQ.'L')GOTO 400
00136          CALL ENDPLT(1)
00137          IF(OUTFLG.EQ.'P')GOTO 420
00138      400 IF(ERR2.NE.0)WRITE(IOUT,410)ERR2
00139      410 FORMAT('1THE MINIMUM-MAXIMUM VALUES FOR THE VARIABLES IN CURVE',
00140         113,' ARE EQUAL')
00141          CALL PLTEND(1)
00142      420 CLOSE(UNIT = 1,DEVICE = 'DSK',DISPOSE = 'DELETE')
00143          RETURN
00144          END

COMMON BLOCKS

/BLOCK1/(+3)
IN      +0      IOUT    +1      OUTFLG  +2
/PLOTX/(+2)
NVARS   +0      LPLOT   +1

SUBPROGRAMS CALLED

ENDPLT  PLCCMP  PLTEND  AMAX1.  PLOTID  PL4020
AMIN1.

SCALARS AND ARRAYS ( "*" NO EXPLICIT DEFINITION - "%" NOT REFERENCED )

 IDF    1       *YMAX   111     PLT     112     *K      113     XYAXIS 114      *IIX    5614
*XMIN   5615     GRDLAB 5616     XYMIN   5726    *XMAX   5776    *INC    5777    *IIY    6002
*NUNIT  6001    *M      6002    *KEY    6003     NFRM   6004    *J      6054     XYMAX  6055
*IXX    6125    *NPLOTS 6126     .S0007 6127     .S0006 6130     ERR2    6131     .S0005 6132
 MODE   6133     .S0004 6203     NCHAR  6204     .S0003 6254     .S0002 6255     .S0001 6256
*IERR   6257    *IYY    6260     .S0000 6261    *IDOT   6262     ERR1    6263    *NSKIP  6264
 IY     6265     .S0014 6335     .S0013 6336     .S0012 6337     .S0011 6340     .S0010 6341

PLOTER  SIM05.FOR       FORTRAN V.4A(317) /KI/C 31-JAN-77       8:41    PAGE 1-3

*YMIN   6342    *I      6343    *IBLANK 6344    BUFFRX 6345     BUFFRY 7332     IX      10317

TEMPORARIES

 .PL016 10475    .00000 10476    .00001 10477    .00002 10500    .00003 10501
```

```
10P          11       12#
110P         45       48#
120P         11       52#
130P         52       56#
140P         11       61#
150P         67       69#
160P         70       71#
170P         71       72#
180P         69       70      71      73#
190P         78       79#
200P         78       84#
20P          17       18#
210P         84       85#
220P         91       92#
230P         92       93#
240P         91       94#
250P         90      100#
260P         83      102#
270P        102      103#
280P        103      104#
290P         84       91      92     101     102     103     107#
300P        109      110#
30P          20       21#
310P        108      112#
320P        116      117#
330P        114      120#
340P        116      121#
350P        122      128#
360P        126      130#
370P        131      132#
380P        130      133#
390P         75      104     106     134#
400P        135      138#
40P          19       23#
410P        138      139#
420P        137      142#
50P          24       25#
60P          23       28#
70P          30       33#
80P          36       37#
90P          38       41#
PLOTER  [ NO ERRORS DETECTED ]
```

```
00001          SUBROUTINE FILTER
00002    C  FILTER PERFORMS THE DIFFERENCE EQUATION CALCULATIONS
00003    C  NECESSARY TO ADVANCE TIME.
00004          DIMENSION DELF1(120),DELF2(120),DELF3(120)
00005          DIMENSION C1F1(29),C1F2(29),C1F3(29),C1F4(29)
00006          COMMON /C1/GEN,20,FILP(30,1,3),SUM(30)
00007          COMMON /C2/G(120,7),LSTUB(31),T,TRP(33,1,5)
00008          COMMON /C3/FIL(120,2,5),R(31,4),FILK(4,120),TIME,DEL(120,2,5)
00009          COMMON /C4/ZFIL(120),XK(31),RP(31),ISTUB(31)
00010          COMMON /C5/C1F1,C1F2,C1F3,C1F4,C2F1,C2F2,C2F3
00011          COMMON /C6/FILL(120,2,5),TRS(60,1,5),CT1(30,3),CT2(60,3)
00012    C  BUS CABLE SIMULATION
00013          DO 10 I = 1,60
00014          DELF1(I) = FIL(I,1,1)-FIL(I,1,2)
00015          DELF2(I) = FIL(I,1,2)-FIL(I,1,3)
00016          DELF3(I) = FIL(I,1,3)-FIL(I,1,4)
00017       10 FIL(I,2,1) = G(I,1)*DELF1(I)+G(I,2)*DELF2(I)+G(I,3)*DELF3(I)+
00018         1G(I,4)*(G(I,7)*FIL(I,1,4)-FIL(I,2,4))+FIL(I,2,2)
00019    C  TRANSFORMER AND STUB SIM FROM BUS TO STUB
00020          DO 20 I = 1,29
00021          IF(ISTUB(I).EQ.0)GOTO 20
00022          M = I+60
00023          L = I+90
00024          TRS(I,1,1) = C1F4(I)*(FIL(M,1,1)+2.0*FIL(M,1,2)+FIL(M,1,3))
00025         1-C1F2(I)*TRS(I,1,2)-C1F1(I)*TRS(I,1,3)
00026          DELF1(I) = TRS(I,1,1)-TRS(I,1,2)
00027          DELF2(I) = TRS(I,1,2)-TRS(I,1,3)
00028          DELF3(I) = TRS(I,1,3)-TRS(I,1,4)
00029          FIL(M,2,1) = G(I,1)*DELF1(I)+G(I,2)*DELF2(I)+G(I,3)*DELF3(I)+
00030         1G(I,4)*(G(I,7)*TRS(I,1,4)-FIL(M,2,4))+FIL(M,2,2)
00031          TRS(I,1,4) = TRS(I,1,3)
00032          TRS(I,1,3) = TRS(I,1,2)
00033          TRS(I,1,2) = TRS(I,1,1)
00034       20 CONTINUE
00035    C  TRANSFORMER AND STUB SIM FROM STUB TO BUS
00036          DO 30 I = 31,60
00037          K = I-30
00038          IF(ISTUB(K).EQ.0)GOTO 30
00039          M = I+30
00040          L = I+60
00041          FIL(L,1,1) = FIL(L,1,1)+(FIL(M,2,1)-FIL(M,2,2))*R(K,4)
00042          DELF1(I) = FIL(L,1,1)-FIL(L,1,2)
00043          DELF2(I) = FIL(L,1,2)-FIL(L,1,3)
00044          DELF3(I) = FIL(L,1,3)-FIL(L,1,4)
00045          FILL(L,2,1) = G(I,1)*DELF1(I)+G(I,2)*DELF2(I)+G(I,3)*DELF3(I)+
00046         1G(I,4)*(G(I,7)*FIL(L,1,4)-FILL(L,2,4))+FILL(L,2,2)
00047          FILL(L,2,4) = FILL(L,2,3)
00048          FILL(L,2,3) = FILL(L,2,2)
00049          FILL(L,2,2) = FILL(L,2,1)
00050    C  REFLECTION FACTOR FROM STUB TO BUS
00051          FILP(K,1,1) = FILL(L,2,1)
00052          TRS(I,1,1) = C2F3*(FILP(K,1,1)+FILP(K,1,2))-C2F1*TRS(I,1,2)
00053          FILP(K,1,3) = FILP(K,1,2)
00054          FILP(K,1,2) = FILP(K,1,1)
00055          FIL(L,2,1) = TRS(I,1,1)
00056          FIL(L,2,2) = TRS(I,1,2)
```

```
00057          FIL(L,2,3) = TRS(I,1,3)
00058          TRS(I,1,3) = TRS(I,1,2)
00059          TRS(I,1,2) = TRS(I,1,1)
00060       30 CONTINUE
00061          RETURN
00062          END
```

COMMON BLOCKS

```
/C1/(+172)
GEN      +0       Z0       +1       FILP     +2       SUM      +134
/C2/(+2015)
G        +0       LSTUB    +1510
T        +1547    TRP      +1550
/C3/(+5675)
FIL      +0       R        +2260    FILK     +2454    TIME     +3414
DEL      +3415
/C4/(+325)
ZFIL     +0       XK       +170     RP       +227     ISTUB    +266
/C5/(+167)
C1F1     +0       C1F2     +35
C1F3     +72      C1F4     +127     C2F1     +164     C2F2     +165     C2F3     +166
/C6/(+3352)
FILL     +0
TRS      +2260    CT1      +2734    CT2      +3066
```

SUBPROGRAMS CALLED

SCALARS AND ARRAYS ("*" NO EXPLICIT DEFINITION - "%" NOT REFERENCED)

```
 DELF2  1        *K       171      DELF1  172      *M       362      .S0002 363      .S0001 364
 .S0000 365      *L       366      *I     367       DELF3  370
```

TEMPORARIES

```
C1              6#
C1F1            5#      10#     24
C1F2            5#      10#     24
C1F3            5#      10#
C1F4            5#      10#     24
C2              7#
C2F1            10#     52
C2F2            10#
C2F3            10#     52
C3              8#
C4              9#
C5              10#
C6              11#
CT1             11#
CT2             11#
DEL             8#
DELF1           4#      14#     17      26#     29      42#     45
DELF2           4#      15#     17      27#     29      43#     45
DELF3           4#      16#     17      28#     29      44#     45
FIL             8#      14      15      16      17#     17      24      29#     2?      41#     41      42      43      44
                45      55#     56#     57#
FILK            8#
FILL            11#     45#     45      47#     47      48#     48      49#     49      51
FILP            6#      51#     52      53#     53      54#     54
FILTER          1#
G               7#      17      29      45
GEN             6#
I               13#     14      15      16      17      20#     21      22      23      24      26      27      28      29
                31      32      33      36#     37      39      40      42      43      44      45      52      55      56
                57      58      59
ISTUB           9#      21      38
K               37#     38      41      51      52      53      54
L               23#     40#     41      42      43      44      45      47      48      49      51      55      56      57
LSTUB           7#
M               22#     24      29      39#     41
R               8#      41
RP              9#
SUM             6#
T               7#
TIME            8#
TRP             7#
TRS             11#     24#     24      26      27      28      29      31#     31      32#     32      33#     33      52#
                52      55      56      57      58#     58      59#     59
XK              9#
Z0              6#
ZFIL            9#
10P             13      17#
20P             20      21      34#
30P             36      38      60#
FILTER  [ NO ERRORS DETECTED ]
```

```
00001          SUBROUTINE PL4020(NPLOT,NCHAR,NP,X,Y,XMIN,XMAX,YMIN,YMAX,
00002         1XLABEL,YLABEL,HEADER,CODE)
00003          REAL X(1),Y(1),XMIN,XMAX,YMIN,YMAX,XSCALE(6),YSCALE(6)
00004          INTEGER MINUS,PLUS,BAR,XNL,YNL,YSIZE,XSIZE,XSIZ18,YSIZ7,BLANK
00005          INTEGER GRAPH(57,118),NPLOT,CODE,NCHAR,NP,XLABEL(72),YLABEL(72)
00006          INTEGER HEADER(72)
00007          COMMON /BLOCK1/IN,N
00008          DATA BLANK/' '/,YSIZ7/57/,XSIZ18/118/,YSIZE/50/,XSIZE/100/
00009          DATA XNL/6/,YNL/6/,IPLOT/0/,BAR/'!'/,MINUS/'-'/,PLUS/'+'/
00010    C  N POINTS TO THE FORTRAN UNIT NUMBER FOR THE PRINTER
00011    C  IPLOT 0=> NO PLOT WAITING; 1=> PLOT WAITING TO BE PRINTED
00012          CODE = 1
00013    C  CHECK IF POINTS ONLY LOGIC IS NEEDED.
00014          IF(NPLOT.GE.2)GOTO 80
00015          IF(IPLOT.EQ.1)GOTO 160
00016    C  BLANK OUT GRAPH
00017       10 CONTINUE
00018          DO 20 I = 1,YSIZ7
00019          DO 20 J = 1,XSIZ18
00020       20 GRAPH(I,J) = BLANK
00021          IPLOT = 1
00022          IF(XMAX.LE.XMIN)GOTO 100
00023          IF(YMAX.LE.YMIN)GOTO 100
00024    C     MODE = 1
00025          XINC = (XSIZE-1)/(XMAX-XMIN)
00026          YINC = (YSIZE-1)/(YMAX-YMIN)
00027          XINCN = (XMAX-XMIN)/(XNL-1)
00028          YINCN = (YMAX-YMIN)/(YNL-1)
00029          XSCALE(1) = XMIN
00030          YSCALE(1) = YMIN
00031          DO 30 I = 2,XNL
00032       30 XSCALE(I) = XSCALE(I-1)+XINCN
00033          DO 40 I = 2,YNL
00034       40 YSCALE(I) = YSCALE(I-1)+YINCN
00035    C  LABELS AND BOARDER
00036          DO 50 I = 1,YSIZE
00037          GRAPH(I+3,1) = YLABEL(I)
00038          GRAPH(I+3,14) = BAR
00039          GRAPH(I+3,XSIZE+15) = BAR
00040       50 CONTINUE
00041          DO 60 I = 1,72
00042          GRAPH(1,I+14) = HEADER(I)
00043       60 GRAPH(YSIZ7,I+14) = XLABEL(I)
00044          DO 70 I = 1,XSIZE
00045          GRAPH(3,I+14) = MINUS
00046          GRAPH(55,I+14) = MINUS
00047       70 CONTINUE
00048          GRAPH(54,14) = PLUS
00049          GRAPH(44,14) = PLUS
00050          GRAPH(34,14) = PLUS
00051          GRAPH(24,14) = PLUS
00052          GRAPH(14,14) = PLUS
00053          GRAPH(4,14) = PLUS
00054          GRAPH(54,115) = PLUS
00055          GRAPH(44,115) = PLUS
00056          GRAPH(34,115) = PLUS
```

```
00057          GRAPH(24,115) = PLUS
00058          GRAPH(14,115) = PLUS
00059          GRAPH(4,115) = PLUS
00060    C  POINTS ONLY LOGIC
00061       80 IF(NP.EQ.0)RETURN
00062          DO 90 I = 1,NP
00063          IF(XMIN.GT.X(I).OR.X(I).GT.XMAX)GOTO 110
00064          XPOS = (X(I)-XMIN)*XINC+0.5
00065          IF(YMIN.GT.Y(I).OR.Y(I).GT.YMAX)GOTO 110
00066          YPOS = (Y(I)-YMIN)*YINC+0.5
00067          IY = YSIZE+3.0-YPOS+1.0
00068          IX = 15.0+XPOS
00069          GRAPH(IY,IX) = NCHAR
00070       90 CONTINUE
00071          RETURN
00072      100 CODE = 2
00073          GOTO 120
00074      110 CODE = 3
00075      120 CONTINUE
00076    C  BLANK OUT GRAPH
00077          DO 130 I = 1,YSIZ7
00078          DO 130 J = 1,XSIZ18
00079      130 GRAPH(I,J) = BLANK
00080          IPLOT = 0
00081          RETURN
00082          ENTRY PLOTID(HEADER)
00083          WRITE(N,140)
00084      140 FORMAT('1')
00085          WRITE(N,150)HEADER
00086      150 FORMAT( ////////////,' ',20X,72A1)
00087          IPLOT = 0
00088          RETURN
00089          ENTRY PLTEND
00090          IPLOT = 0
00091      160 CONTINUE
00092          WRITE(N,170)
00093      170 FORMAT('1')
00094          DO 190 I = 1,3
00095          WRITE(N,180)(GRAPH(I,J), J = 1,XSIZ18)
00096      180 FORMAT(' ',118A1)
00097      190 CONTINUE
00098          I = 4
00099          WRITE(N,200)GRAPH(I,1),YSCALE(6),(GRAPH(I,J), J = 14,XSIZ18)
00100      200 FORMAT(' ',   A1,1X,E11.4,110A1)
00101          DO 210 I = 5,13
00102      210 WRITE(N,220)(GRAPH(I,J), J = 1,XSIZ18)
00103      220 FORMAT(' ',118A1)
00104          I = 14
00105          WRITE(N,230)GRAPH(I,1),YSCALE(5),(GRAPH(I,J), J = 14,XSIZ18)
00106      230 FORMAT(' ',   A1,1X,E11.4,110A1)
00107          DO 240 I = 15,23
00108      240 WRITE(N,250)(GRAPH(I,J), J = 1,XSIZ18)
00109      250 FORMAT(' ',118A1)
00110          I = 24
00111          WRITE(N,260)GRAPH(I,1),YSCALE(4),(GRAPH(I,J), J = 14,XSIZ18)
00112      260 FORMAT(' ',   A1,1X,E11.4,110A1)
```

```
00113          DO 270 I = 25,33
00114      270 WRITE(N,280)(GRAPH(I,J), J = 1,XSIZ18)
00115      280 FORMAT(' ',118A1)
00116          I = 34
00117          WRITE(N,290)GRAPH(I,1),YSCALE(3),(GRAPH(I,J), J = 14,XSIZ18)
00118      290 FORMAT(' ',   A1,1X,E11.4,110A1)
00119          DO 300 I = 35,43
00120      300 WRITE(N,310)(GRAPH(I,J), J = 1,XSIZ18)
00121      310 FORMAT(' ',118A1)
00122          I = 44
00123          WRITE(N,320)GRAPH(I,1),YSCALE(2),(GRAPH(I,J), J = 14,XSIZ18)
00124      320 FORMAT(' ',   A1,1X,E11.4,110A1)
00125          DO 330 I = 45,53
00126      330 WRITE(N,340)(GRAPH(I,J), J = 1,XSIZ18)
00127      340 FORMAT(' ',118A1)
00128          I = 54
00129          WRITE(N,350)GRAPH(I,1),YSCALE(1),(GRAPH(I,J), J = 14,XSIZ18)
00130      350 FORMAT(' ',   A1,1X,E11.4,110A1)
00131          I = 55
00132          WRITE(N,360)(GRAPH(I,J), J = 1,XSIZ18)
00133      360 FORMAT(' ',118A1)
00134          WRITE(N,370)XSCALE
00135      370 FORMAT(' ',4X,E11.4,5(9X,E11.4))
00136          DO 380 I = 56,57
00137      380 WRITE(N,390)(GRAPH(I,J), J = 1,XSIZ18)
00138      390 FORMAT(' ',118A1)
00139          IF(IPLOT.EQ.1)GOTO 10
00140          GOTO 120
00141          RETURN
00142          END
```

COMMON BLOCKS

/BLOCK1/(+2)
IN +0 N +1

SUBPROGRAMS CALLED

SCALARS AND ARRAYS ["*" NO EXPLICIT DEFINITION - "%" NOT REFERENCED]

.S0020	1	YMAX	2	.S0036	3	.S0035	4	.S0034	5	YLABEL	6
.S0033	7	.S0032	10	.S0031	11	XMIN	12	.S0030	13	YSCALE	14
*YPOS	22	*XINCN	23	XSIZE	24	MINUS	25	BAR	26	XSIZ18	27
Y	30	XMAX	31	BLANK	32	YNL	33	XLABEL	34	*J	35
.S0007	36	XSCALE	37	.S0006	45	*XPOS	46	.S0005	47	.S0004	50
NCHAR	51	.S0003	52	*IPLOT	53	YSIZ7	54	.S0002	55	*YINC	56
.S0001	57	.S0000	60	NP	61	PLUS	62	.S0017	63	X	64
.S0016	65	.S0015	66	*IY	67	.S0014	70	.S0013	71	.S0012	72
.S0011	73	.S0010	74	XNL	75	YMIN	76	*I	77	*YINCN	100
NPLOT	101	.S0027	102	.S0026	103	*IX	104	YSIZE	105	.S0025	106
.S0024	107	*XINC	110	.S0023	111	HEADER	112	.S0022	113	GRAPH	114
CODE	15222	.S0021	15223								

TEMPORARIES

 .PL416 15327 .PL417 15330

```
10P          17#     139
110P         63       65       74#
120P         73       75#     140
130P         77       78       79#
140P         83       84#
150P         85       86#
160P         15       91#
170P         92       93#
180P         95       96#
190P         94       97#
200P         99      100#
20P          18       19       20#
210P        101      102#
220P        102      103#
230P        105      106#
240P        107      108#
250P        108      109#
260P        111      112#
270P        113      114#
280P        114      115#
290P        117      118#
300P        119      120#
30P          31       32#
310P        120      121#
320P        123      124#
330P        125      126#
340P        126      127#
350P        129      130#
360P        132      133#
370P        134      135#
380P        136      137#
390P        137      138#
40P          33       34#
50P          36       40#
60P          41       43#
70P          44       47#
80P          14       61#
90P          62       70#
PL4020  [ NO ERRORS DETECTED ]
```

```
00001          SUBROUTINE PLCCMP(NPLOT,NP,X,Y,XMIN,XMAX,YMIN,YMAX,
00002         1XLABEL,YLABEL,HEADER,CODE)
00003     C    THIS ROUTINE IS THE CAL-COMP PLOTTER AND TEKTRONIX DRIVER.
00004          REAL IX,IY,X(1),Y(1),XMIN,XMAX,YMIN,YMAX,XSCALE(6),YSCALE(6)
00005          INTEGER XNL,YNL,YSIZE,XSIZE,XSIZ18,YSIZ7,BLANK
00006          INTEGER GRAPH(57,118),NPLOT,HEADER(72),NP,XLABEL(72),YLABEL(72)
00007          INTEGER CODE
00008          DATA BLANK/' '/,YSIZ7/57/,XSIZ18/118/,YSIZE/690/,XSIZE/900/
00009          DATA XNL/6/,YNL/6/,IPLOT/0/
00010     C  IPLOT 0 => NO PLOT WAITING; 1 => PLOT WAITING TO BE PRINTED
00011          CODE = 1
00012     C  CHECK IF POINTS ONLY LOGIC IS NEEDED.
00013          IF(NPLOT.GE.2)GOTO 90
00014          IF(IPLOT.EQ.1)GOTO 140
00015     C  BLANK OUT GRAPH
00016          TYPE 10
00017       10 FORMAT(' DO YOU WANT A TEKTRONIX(T) OR A CAL-COMP(C) PLOT?')
00018          ACCEPT 20,T
00019       20 FORMAT(A1)
00020       30 CONTINUE
00021          DO 40 I = 1,YSIZ7
00022          DO 40 J = 1,XSIZ18
00023       40 GRAPH(I,J) = BLANK
00024          IPLOT = 1
00025          IF(XMAX.LE.XMIN)GOTO 110
00026          IF(YMAX.LE.YMIN)GOTO 110
00027          IF(T.EQ.'T') XSIZE = 625
00028          XINC = (XSIZE)/(XMAX-XMIN)
00029          IF(T.EQ.'T') YSIZE = 690
00030          YINC = (YSIZE)/(YMAX-YMIN)
00031          XINCN = (XMAX-XMIN)/(XNL-1)
00032          YINCN = (YMAX-YMIN)/(YNL-1)
00033          XSCALE(1) = XMIN
00034          YSCALE(1) = YMIN
00035          DO 50 I = 2,XNL
00036       50 XSCALE(I) = XSCALE(I-1)+XINCN
00037          DO 60 I = 2,YNL
00038       60 YSCALE(I) = YSCALE(I-1)+YINCN
00039          IF(T.EQ.'T')GOTO 70
00040          CALL PLTCC (XSCALE,YSCALE,XLABEL,YLABEL,HEADER)
00041          GOTO 80
00042       70 CALL PLTTX (XSCALE,YSCALE,XLABEL,YLABEL,HEADER)
00043       80 GOTO 90
00044     C  POINTS ONLY LOGIC
00045       90 IF(NP.EQ.0)RETURN
00046          DO 100 I = 1,NP
00047          IF(XMIN.GT.X(I).OR.X(I).GT.XMAX)GOTO 120
00048          XPOS = (X(I)-XMIN)*XINC
00049          IF(YMIN.GT.Y(I).OR.Y(I).GT.YMAX)GOTO 120
00050          YPOS = (Y(I)-YMIN)*YINC
00051          IY = YPOS*0.01+.8
00052          IF(T.EQ.'T') IY = YPOS*.007+.56
00053          IX = XPOS*0.01+1.4
00054          IF(I.EQ.'T') IX = XPOS*.007+.98
00055          IPEN = 1
00056          IF(I.EQ.1)IPEN = 3
```

```
00057          IF(I.EQ.2)IPEN = 2
00058          CALL PLOT(IX,IY,IPEN)
00059      100 CONTINUE
00060      C  MOVE PEN TO PREPARE PLOTER FOR NEXT PLOT.
00061          X1 = 12.
00062          Y1 = 0.
00063          CALL PLOT(X1,Y1,3)
00064          RETURN
00065      110 CODE = 2
00066          GOTO 120
00067      120 CODE = 3
00068      130 IPLOT = 0
00069          RETURN
00070          ENTRY ENDPLT
00071          IPLOT = 0
00072          RETURN
00073      140 CONTINUE
00074          IF(IPLOT.EQ.1)GOTO 30
00075          GOTO 130
00076          RETURN
00077          END
```

SUBPROGRAMS CALLED

PLTCC
PLTTX PLOT

SCALARS AND ARRAYS ["*" NO EXPLICIT DEFINITION - "%" NOT REFERENCED]

*T	1	YMAX	2	YLABEL	3	XMIN	4	YSCALE	5	*YPOS	13				
*XINCN	14	XSIZE	15	*Y1	16	XSIZ18	17	Y	20	XMAX	21				
BLANK	22	YNL	23	XLABEL	24	*J	25	XSCALE	26	*XPOS	34				
.S0004	35	.S0003	36	*IPLOT	37	YSIZ7	40	.S0002	41	*YINC	42				
.S0001	43	.S0000	44	NP	45	*IPEN	46	*X1	47	X	50				
IY	51	XNL	52	YMIN	53	*I	54	*YINCN	55	NPLOT	56				
YSIZE	57	IX	60	*XINC	61	HEADER	62	GRAPH	63	CODE	15171				

TEMPORARIES

.PLC16 15206 .PLC17 15207

```
BLANK      5#     8#     23
CODE       1#     7#     11#    65#    67#
ENDPLT     70#
GRAPH      6#     23#
HEADER     1#     6#     40     40#    42     42#
I          21#    23     35#    36     37#    38     46#    47     48     49     50     54     56     57
IPEN       55#    56#    57#    58     58#
IPLOT      9#     14     24#    68#    71#    74
IX         4#     53#    54#    58     58#
IY         4#     51#    52#    58     58#
J          22#    23
NP         1#     6#     45     46
NPLOT      1#     6#     13
PLCCMP     1#
PLOT       58     63
PLTCC      40
PLTTX      42
T          18#    27     29     39     52
X          1#     4#     47     48
X1         61#    63     63#
XINC       28#    48
XINCN      31#    36
XLABEL     1#     6#     40     40#    42     42#
XMAX       1#     4#     25     28     31     47
XMIN       1#     4#     25     28     31     33     47     48
XNL        5#     9#     31     35
XPOS       48#    53     54
XSCALE     4#     33#    36#    36     40     40#    42     42#
XSIZ18     5#     8#     22
XSIZE      5#     8#     27#    28
Y          1#     4#     49     50
Y1         62#    63     63#
YINC       30#    50
YINCN      32#    38
YLABEL     1#     6#     40     40#    42     42#
YMAX       1#     4#     26     30     32     49
YMIN       1#     4#     26     30     32     34     49     50
YNL        5#     9#     32     37
YPOS       50#    51     52
YSCALE     4#     34#    38#    38     40     40#    42     42#
YSIZ7      5#     8#     21
YSIZE      5#     8#     29#    30
100P       46     59#
10P        16     17#
110P       25     26     65#
120P       47     49     66     67#
130P       68#    75
140P       14     73#
20P        18     19#
30P        20#    74
40P        21     22     23#
50P        35     36#
60P        37     38#

70P        39     42#
80P        41     43#
90P        13     43     45#
PLCCMP   [ NO ERRORS DETECTED ]
```

```
00001          SUBROUTINE PLTCC(XSCALE,YSCALE,XLABEL,YLABEL,GRDLAB)
00002    C  PLTCC PERFORMS THE GRAPH OUTLINE, X AND Y LABELS, HEADER,
00003    C  AND X AND Y SCALE ON THE CAL-COMP PLOTTER.
00004          REAL XSCALE(1),YSCALE(1)
00005          DIMENSION XLABEL(15),YLABEL(15),GRDLAB(72),ENCBUF(3),HDRBUF(15)
00006          CALL PLOTS(I)
00007    C  2 = PEN DOWN
00008    C  3 = PEN UP
00009          X = 0.0
00010          Y = 0.0
00011          CALL PLOT(X,Y,3)
00012          X = 1.4
00013          Y = .7
00014          CALL PLOT(X,Y,3)
00015          X = 1.4
00016          Y = 7.75
00017          CALL PLOT(X,Y,2)
00018          X = 1.35
00019          Y = 7.75
00020          CALL PLOT(X,Y,3)
00021          X = 10.4
00022          Y = 7.75
00023          CALL PLOT(X,Y,2)
00024          X = 10.4
00025          Y = .7
00026          CALL PLOT(X,Y,2)
00027          X = 10.4
00028          Y = .75
00029          CALL PLOT(X,Y,3)
00030          X = 1.35
00031          Y = .75
00032          CALL PLOT(X,Y,2)
00033          X = 3.20
00034          Y = .70
00035          CALL PLOT(X,Y,3)
00036          X = 3.20
00037          Y = .80
00038          CALL PLOT(X,Y,2)
00039          X = 5.0
00040          Y = .70
00041          CALL PLOT(X,Y,3)
00042          X = 5.0
00043          Y = .80
00044          CALL PLOT(X,Y,2)
00045          X = 6.8
00046          Y = .70
00047          CALL PLOT(X,Y,3)
00048          X = 6.8
00049          Y = .80
00050          CALL PLOT(X,Y,2)
00051          X = 8.6
00052          Y = .70
00053          CALL PLOT(X,Y,3)
00054          X = 8.6
00055          Y = .80
00056          CALL PLOT(X,Y,2)
```

```
00057          X = 1.35
00058          Y = 2.15
00059          CALL PLOT(X,Y,3)
00060          X = 1.45
00061          Y = 2.15
00062          CALL PLOT(X,Y,2)
00063          X = 1.35
00064          Y = 3.55
00065          CALL PLOT(X,Y,3)
00066          X = 1.45
00067          Y = 3.55
00068          CALL PLOT(X,Y,2)
00069          X = 1.35
00070          Y = 4.95
00071          CALL PLOT(X,Y,3)
00072          X = 1.45
00073          Y = 4.95
00074          CALL PLOT(X,Y,2)
00075          X = 1.35
00076          Y = 6.35
00077          CALL PLOT(X,Y,3)
00078          X = 1.45
00079          Y = 6.35
00080          CALL PLOT(X,Y,2)
00081          CALL SYMBOL(0.1,5.225,.1,YLABEL(1),0.,1)
00082          CALL SYMBOL(0.1,5.075,.1,YLABEL(2),0.,1)
00083          CALL SYMBOL(0.1,4.925,.1,YLABEL(3),0.,1)
00084          CALL SYMBOL(0.1,4.775,.1,YLABEL(4),0.,1)
00085          CALL SYMBOL(0.1,4.625,.1,YLABEL(5),0.,1)
00086          CALL SYMBOL(0.1,4.475,.1,YLABEL(6),0.,1)
00087          CALL SYMBOL(0.1,4.325,.1,YLABEL(7),0.,1)
00088          CALL SYMBOL(0.1,4.175,.1,YLABEL(8),0.,1)
00089          CALL SYMBOL(0.1,4.025,.1,YLABEL(9),0.,1)
00090          CALL SYMBOL(0.1,3.875,.1,YLABEL(10),0.,1)
00091          CALL SYMBOL(0.1,3.725,.1,YLABEL(11),0.,1)
00092          CALL SYMBOL(0.1,3.575,.1,YLABEL(12),0.,1)
00093          CALL SYMBOL(0.1,3.425,.1,YLABEL(13),0.,1)
00094          CALL SYMBOL(0.1,3.275,.1,YLABEL(14),0.,1)
00095          CALL SYMBOL(0.1,3.125,.1,YLABEL(15),0.,1)
00096          ENCODE(15,10,ENCBUF)XLABEL
00097       10 FORMAT(15A1)
00098          CALL SYMBOL(4.8,00.2,.1,ENCBUF,0.,15)
00099          ENCODE(72,20,HDRBUF)GRPLAB
00100       20 FORMAT(72A1)
00101          CALL SYMBOL(2.4,8.10,.1,HDRBUF,0.,63)
00102          XINC1 = 0.9
00103          DO 40 I = 1,6
00104          ENCODE(10,30,ENCBUF)XSCALE(I)
00105       30 FORMAT(E10.4)
00106          CALL SYMBOL(XINC1,.45,.1,ENCBUF,0.,10)
00107       40 XINC1 = XINC1 + 1.8
00108          YINC1 = 0.7
00109          DO 60 I = 1,6
00110          ENCODE(10,50,ENCBUF)YSCALE(I)
00111       50 FORMAT(E10.4)
00112          CALL SYMBOL(.3,YINC1,.1,ENCBUF,0.,10)
```

```
00113      60 YINC1 = YINC1 + 1.4
00114         X = 0.
00115         Y = 0.
00116         CALL PLOT(X,Y,3)
00117         X = 0.
00118         Y = 8.5
00119         CALL PLOT(X,Y,2)
00120         X = 11.
00121         Y = 8.5
00122         CALL PLOT(X,Y,2)
00123         X = 11.
00124         Y = 0.
00125         CALL PLOT(X,Y,2)
00126         X = 0.
00127         CALL PLOT(X,Y,2)
00128         RETURN
00129         END
```

SUBPROGRAMS CALLED

PLOTS
SYMBOL PLOT

SCALARS AND ARRAYS ["*" NO EXPLICIT DEFINITION - "%" NOT REFERENCED]

```
 ENCBUF 1        YLABEL 4        GRDLAB 5        YSCALE 6        *YINC1  7       *Y      10
 XLABEL 11       XSCALE 12       .S0001 13       .S0000 14       *XINC1  15      *X      16
*I      17       HDRBUF 20
```

TEMPORARIES

```
 .PLT16 47       .Q0000 50
```

```
ENCBUF      5#    96#    98     98#    104#   106    106#   110#   112    112#
GRDLAB      1#     5#    99
HDRBUF      5#    99#   101    101#
I           6     6#    103#   104    109#   110
PLOT       11    14     17     20     23     26     29     32     35     38     41     44     47     50
           53    56     59     62     65     68     71     74     77     80    116    119    122    125
          127
PLOTS       6
PLTCC       1#
SYMBOL     81    82     83     84     85     86     87     88     89     90     91     92     93     94
           95    98    101    106    112
X           9#    11    11#    12#    14    14#    15#    17    17#    18#    20    20#    21#    23
           23#   24#    26     26#    27#    29     29#    30#    32     32#    33#    35     35#    36#
           38    38#    39#    41     41#    42#    44     44#    45#    47     47#    48#    50     50#
           51#   53     53#    54#    56     56#    57#    59     59#    60#    62     62#    63#    65
           65#   66#    68     68#    69#    71     71#    72#    74     74#    75#    77     77#    78#
           80    80#   114#   116    116#   117#   119    119#   120#   122    122#   123#   125    125#
          126#  127    127#
XINC1      102#  106    106#   107    107#
XLABEL      1#     5#    96
XSCALE      1#     4#   104
Y          10#    11    11#    13#    14    14#    16#    17    17#    19#    20    20#    22#    23
           23#   25#    26     26#    28#    29     29#    31#    32     32#    34#    35     35#    37#
           38    38#    40#    41     41#    43#    44     44#    46#    47     47#    49#    50     50#
           52#   53     53#    55#    56     56#    58#    59     59#    61#    62     62#    64#    65
           65#   67#    68     68#    70#    71     71#    73#    74     74#    76#    77     77#    79#
           80    80#   115#   116    116#   118#   119    119#   121#   122    122#   124#   125    125#
          127   127#
YINC1      108#  112    112#   113    113#
YLABEL      1#     5#    81     81#    82     82#    83     83#    84     84#    85     85#    86     86#
           87    87#    88     88#    89     89#    90     90#    91     91#    92     92#    93     93#
           94    94#    95     95#
YSCALE      1#     4#   110
10P        96    97#
20P        99    100#
30P       104    105#
40P       103    107#
50P       110    111#
60P       109    113#
PLTCC   [ NO ERRORS DETECTED ]
```

```
00001          SUBROUTINE PLTTX(XSCALE,YSCALE,XLABEL,YLABEL,GRDLAB)
00002    C  PLTTX PERFORMES THE GRAPH OUTLINE, X AND Y LABELS, HEADER,
00003    C  AND X AND Y SCALE ON THE TEKTRONIX DISPLAY UNIT.
00004          EXTERNAL PLOT3
00005          REAL XSCALE(1),YSCALE(1)
00006          DIMENSION XLABEL(15),YLABEL(15),GRDLAB(72),ENCBUF(3),HDRBUF(15)
00007          CALL PLTSEL(PLOT3)
00008          ACCEPT 10
00009       10 FORMAT(A1)
00010          CALL PLOTNP
00011          ACCEPT 20
00012       20 FORMAT(A1)
00013    C  2 = PEN DOWN
00014    C  3 = PEN UP
00015          X = 0.0
00016          Y = 0.0
00017          CALL PLOT(X,Y,3)
00018          X = 1.38
00019          Y = .49
00020          CALL PLOT(X,Y,3)
00021          X = 1.38
00022          Y = 5.425
00023          CALL PLOT(X,Y,2)
00024          X = 1.3
00025          Y = 5.425
00026          CALL PLOT(X,Y,3)
00027          X = 7.68
00028          Y = 5.425
00029          CALL PLOT(X,Y,2)
00030          X = 7.68
00031          Y = .49
00032          CALL PLOT(X,Y,2)
00033          X = 7.68
00034          Y = .525
00035          CALL PLOT(X,Y,3)
00036          X = 1.34
00037          Y = .525
00038          CALL PLOT(X,Y,2)
00039          X = 2.64
00040          Y = .49
00041          CALL PLOT(X,Y,3)
00042          X = 2.64
00043          Y = .56
00044          CALL PLOT(X,Y,2)
00045          X = 3.9
00046          Y = .49
00047          CALL PLOT(X,Y,3)
00048          X = 3.9
00049          Y = .56
00050          CALL PLOT(X,Y,2)
00051          X = 5.15
00052          Y = .49
00053          CALL PLOT(X,Y,3)
00054          X = 5.15
00055          Y = .56
00056          CALL PLOT(X,Y,2)
```

```
00057          X = 6.42
00058          Y = .49
00059          CALL PLOT(X,Y,3)
00060          X = 6.42
00061          Y = .56
00062          CALL PLOT(X,Y,2)
00063          X = 1.34
00064          Y = 1.505
00065          CALL PLOT(X,Y,3)
00066          X = 1.415
00067          Y = 1.505
00068          CALL PLOT(X,Y,2)
00069          X = 1.34
00070          Y = 2.485
00071          CALL PLOT(X,Y,3)
00072          X = 1.415
00073          Y = 2.485
00074          CALL PLOT(X,Y,2)
00075          X = 1.34
00076          Y = 3.465
00077          CALL PLOT(X,Y,3)
00078          X = 1.415
00079          Y = 3.465
00080          CALL PLOT(X,Y,2)
00081          X = 1.34
00082          Y = 4.445
00083          CALL PLOT(X,Y,3)
00084          X = 1.415
00085          Y = 4.445
00086          CALL PLOT(X,Y,2)
00087          CALL SYMBOL(0.1,3.975,.1,YLABEL(1),0.,1)
00088          CALL SYMBOL(0.1,3.825,.1,YLABEL(2),0.,1)
00089          CALL SYMBOL(0.1,3.675,.1,YLABEL(3),0.,1)
00090          CALL SYMBOL(0.1,3.525,.1,YLABEL(4),0.,1)
00091          CALL SYMBOL(0.1,3.375,.1,YLABEL(5),0.,1)
00092          CALL SYMBOL(0.1,3.225,.1,YLABEL(6),0.,1)
00093          CALL SYMBOL(0.1,3.075,.1,YLABEL(7),0.,1)
00094          CALL SYMBOL(0.1,2.925,.1,YLABEL(8),0.,1)
00095          CALL SYMBOL(0.1,2.775,.1,YLABEL(9),0.,1)
00096          CALL SYMBOL(0.1,2.625,.1,YLABEL(10),0.,1)
00097          CALL SYMBOL(0.1,2.475,.1,YLABEL(11),0.,1)
00098          CALL SYMBOL(0.1,2.325,.1,YLABEL(12),0.,1)
00099          CALL SYMBOL(0.1,2.175,.1,YLABEL(13),0.,1)
00100          CALL SYMBOL(0.1,2.025,.1,YLABEL(14),0.,1)
00101          CALL SYMBOL(0.1,1.875,.1,YLABEL(15),0.,1)
00102          ENCODE(15,30,ENCBUF)XLABEL
00103       30 FORMAT(15A1)
00104          CALL SYMBOL(3.2,0.1,.1,ENCBUF,0.,15)
00105          ENCODE(72,40,HDRBUF)GRDLAB
00106       40 FORMAT(72A1)
00107          CALL SYMBOL(1.35,5.6,.1,HDRBUF,0.,63)
00108          XINC1 = .63
00109          DO 60 I = 1,6
00110          ENCODE(10,50,ENCBUF)XSCALE(I)
00111       50 FORMAT(E10.4)
00112          CALL SYMBOL(XINC1,.315,.1,ENCBUF,0.,10)
```

```
00113      60 XINC1 = XINC1 + 1.26
00114         YINC1 = .49
00115         DO 80 I = 1,6
00116         ENCODE(10,70,ENCBUF)YSCALE(I)
00117      70 FORMAT(E10.4)
00118         CALL SYMBOL(.21,YINC1,.1,ENCBUF,0.,10)
00119      80 YINC1 = YINC1+.98
00120         X = 0.
00121         Y = 0.
00122         CALL PLOT(X,Y,3)
00123         X = 0.
00124         Y = 5.95
00125         CALL PLOT(X,Y,2)
00126         X = 8.1
00127         Y = 5.95
00128         CALL PLOT(X,Y,2)
00129         X = 8.1
00130         Y = 0.
00131         CALL PLOT(X,Y,2)
00132         X = 0.
00133         Y = 0.
00134         CALL PLOT(X,Y,2)
00135         RETURN
00136         END
```

SUBPROGRAMS CALLED

PLOT3
SYMBOL PLOTNP PLOT PLTSEL

SCALARS AND ARRAYS ["*" NO EXPLICIT DEFINITION - "%" NOT REFERENCED]

```
 ENCBUF 1        YLABEL 4        GRDLAB 5        YSCALE 6        *YINC1  7       *Y      10
 XLABEL 11       XSCALE 12       .S0001 13       .S0000 14       *XINC1  15      *X      16
*I      17       HDRBUF 20
```

TEMPORARIES

```
 .PLT16 51       .Q0000 52
```

```
ENCBUF      6#    102#   104    104#   110#   112    112#   116#   118    118#
GRDLAB      1#      8#   105
HDRBUF      6#    105#   107    107#
I         109#    110    115#   116
PLOT       17     20     23     26     29     32     35     36     41     44     47     50     53     56
           59     62     65     68     71     74     77     80     83     86    122    125    128    131
          134
PLOT3       4#     7
PLOTNP     10
PLTSEL      7
PLTTX       1#
SYMBOL     87     88     89     90     91     92     93     94     95     96     97     98     99    100
          101    104    107    112    118
X          15#    17     17#    18#    20     20#    21#    23     23#    24#    26     26#    27#    29
           29#    30#    32     32#    33#    35     35#    36#    38     38#    39#    41     41#    42#
           44     44#    45#    47     47#    48#    50     50#    51#    53     53#    54#    56     56#
           57#    59     59#    60#    62     62#    63#    65     65#    66#    68     68#    69#    71
           71#    72#    74     74#    75#    77     77#    78#    80     80#    81#    83     83#    84#
           86     86#    120#   122    122#   123#   125    125#   126#   128    128#   129#   131    131#
          132#   134    134#
XINC1     108#   112    112#   113    113#
XLABEL      1#     6#   102
XSCALE      1#     5#   110
Y          16#    17     17#    19#    20     20#    22#    23     23#    25#    26     26#    28#    29
           29#    31#    32     32#    34#    35     35#    37#    38     38#    40#    41     41#    43#
           44     44#    46#    47     47#    49#    50     50#    52#    53     53#    55#    56     56#
           58#    59     59#    61#    62     62#    64#    65     65#    67#    68     68#    70#    71
           71#    73#    74     74#    76#    77     77#    79#    80     80#    82#    83     83#    85#
           86     86#    121#   122    122#   124#   125    125#   127#   128    128#   130#   131    131#
          133#   134    134#
YINC1     114#   118    118#   119    119#
YLABEL      1#     6#   87     87#    88     88#    89     89#    90     90#    91     91#    92     92#
           93     93#    94     94#    95     95#    96     96#    97     97#    98     98#    99     99#
          100    100#   101    101#
YSCALE      1#     5#   116
10P         8      9#
20P        11     12#
30P       102    103#
40P       105    106#
50P       110    111#
60P       109    113#
70P       116    117#
80P       115    119#
PLTTX   ( NO ERRORS DETECTED )
```

APPENDIX B

INPUT DATA

```
BEGINNING OF JOB
 &SECT
 T=13.3E-9,CCMAX=350,ZX=112.,LENGT=120*10,K250=0.892,K1500=0.9357
 ALPHA=.0085,R(30,4)=0.0,R(31,4)=0.0,Z0=68.,ZL=31*2200.
 &END
 &TRAN1
 GAIN1=0.26767,WNSQ1=4.953E14,TWOZW1=8E6
 &END
 &TRAN2
 GAIN2=0.247218,ROOT2=2E7
 &END
 &GENXFR
 GAIN3=0.38,POLE=8.9E6,REF1=-.066
 &END
 &STUB
 NPSKIP=2,
 ISTUB=31*0
 LSTUB=31*0
 &END
 &GENER
 GENMAX=1.0,TSLOPE=50.E-9,NCCIN=115,NCCF=38,IGEN=0,ZG=68
 &END
 &SKIN
 GI1=.973,GI2=.0079,GI3=.0060858
 &END
24240101
0101 0 0  0102 0 0  0103 0 0  0104 0 0  0105 0 0  0106 0 0  0107 0 0  0108 0 0
0109 0 0  0110 0 0  0111 0 0  0112 0 0  0103 0 0  0114 0 0  0115 0 0  0116 0 0
0117 0 0  0118 0 0  0119 0 0  0120 0 0  0121 0 0  0122 0 0  0123 0 0  0124 0 0
      DATA BUS SIMULATION OF A 68 OHM TWISTED SHIELDED PAIR
CASE NUMBER 1
   TIME IN SEC
   TOTAL INPUT
   TOTAL OUTPUT
   FIL(2)
   FIL(3)
   STUB(3)
   FIL(4)
   STUB(4)
   FIL(6)
   STUB(6)
   FIL(8)
   STUB(8)
   FIL(10)
   STUB(10)
   FIL(12)
   FIL(22)
   STUB(22)
   FIL(24)
   STUB(24)
   FIL(26)
   STUB(26)
   FIL(28)
   STUB(28)
   GENERATOR
BEGINNING OF JOB
 &SECT
 T=13.3E-9,CCMAX=350,ZX=112.,LENGT=120*10,K250=0.892,K1500=0.9357
 ALPHA=.0085,R(30,4)=0.0,R(31,4)=0.0,Z0=68.,ZL=31*2200.
 &END
```

```
 &TRAN1
 GAIN1=0.26767,WNSQ1=4.953E14,TWOZW1=8E6
 &END
 &TRAN2
 GAIN2=0.247218,ROOT2=2E7
 &END
 &GENXFR
 GAIN3=0.38,POLE=8.9E6,REF1=-.066
 &END
 &STUB
 NPSKIP=2,
 ISTUB=0,0,1,28*0
 LSTUB=0,0,10,28*0
 &END
 &GENER
 GENMAX=1.0,TSLOPE=50.E-9,NCCIN=94,NCCF=32,IGEN=0,ZG=68
 &END
 &SKIN
 GI1=.973,GI2=.0079,GI3=.0060858
 &END
24240101
0101 0 0  0102 0 0  0103 0 0  0104 0 0  0105 0 0  0106 0 0  0107 0 0  0108 0 0
0109 0 0  0110 0 0  0111 0 0  0112 0 0  0103 0 0  0114 0 0  0115 0 0  0116 0 0
0117 0 0  0118 0 0  0119 0 0  0120 0 0  0121 0 0  0122 0 0  0123 0 0  0124 0 0
      DATA BUS SIMULATION OF A 68 OHM TWISTED SHIELDED PAIR
CASE NUMBER 2
   TIME IN SEC
   TOTAL INPUT
   TOTAL OUTPUT
   FIL(2)
   FIL(3)
   STUB(3)
   FIL(4)
   STUB(4)
   FIL(6)
   STUB(6)
   FIL(8)
   STUB(8)
   FIL(10)
   STUB(10)
   FIL(12)
   FIL(22)
   STUB(22)
   FIL(24)
   STUB(24)
   FIL(26)
   STUB(26)
   FIL(28)
   STUB(28)
   GENERATOR
BEGINNING OF JOB
 &SECT
 T=13.3E-9,CCMAX=350,ZX=112.,LENGT=120*10,K250=0.892,K1500=0.9357
 ALPHA=.0085,R(30,4)=0.0,R(31,4)=0.0,Z0=68.,ZL=31*2200.
 &END
 &TRAN1
 GAIN1=0.26767,WNSQ1=4.953E14,TWOZW1=8E6
 &END
 &TRAN2
 GAIN2=0.247218,ROOT2=2E7
```

```
 &END
 &GENXFR
 GAIN3=0.38,POLE=8.9E6,REF1=-.066
 &END
 &STUB
 NPSKIP=2,
 ISTUB=0,0,1,28*0
 LSTUB=0,0,20,28*0
 &END
 &GENER
 GENMAX=1.0,TSLOPE=50.E-9,NCCIN=94,NCCF=32,IGEN=0,ZG=68
 &END
 &SKIN
 GI1=.973,GI2=.0079,GI3=.0060858
 &END
24240101
0101 0 0  0102 0 0  0103 0 0  0104 0 0  0105 0 0  0106 0 0  0107 0 0  0108 0 0
0109 0 0  0110 0 0  0111 0 0  0112 0 0  0103 0 0  0114 0 0  0115 0 0  0116 0 0
0117 0 0  0118 0 0  0119 0 0  0120 0 0  0121 0 0  0122 0 0  0123 0 0  0124 0 0
      DATA BUS SIMULATION OF A 68 OHM TWISTED SHIELDED PAIR
CASE NUMBER 3
   TIME IN SEC
   TOTAL INPUT
   TOTAL OUTPUT
   FIL(2)
   FIL(3)
   STUB(3)
   FIL(4)
   STUB(4)
   FIL(6)
   STUB(6)
   FIL(8)
   STUB(8)
   FIL(10)
   STUB(10)
   FIL(12)
   FIL(22)
   STUB(22)
   FIL(24)
   STUB(24)
   FIL(26)
   STUB(26)
   FIL(28)
   STUB(28)
   GENERATOR
BEGINNING OF JOB
 &SECT
 T=13.3E-9,CCMAX=350,ZX=112.,LENGT=120*10,K250=0.892,K1500=0.9357
 ALPHA=.0085,R(30,4)=0.0,R(31,4)=0.0,Z0=68.,ZL=31*2200.
 &END
 &TRAN1
 GAIN1=0.26767,WNSQ1=4.953E14,TWOZW1=8E6
 &END
 &TRAN2
 GAIN2=0.247210,ROOT2=2E7
 &END
 &GENXFR
 GAIN3=0.38,POLE=8.9E6,REF1=-.066
 &END
 &STUB
```

```
 NPSKIP=2,
 ISTUB=0,0,0,1,0,1,0,1,0,1,11*0,1,0,1,0,1,0,1,0,0,0
 LSTUB=0.0,0,10,0,10,0,10,0,10,11*0,10,0,10,0,10,0,10,0,0,0
 &END
 &GENER
 GENMAX=1.0,TSLOPE=50.E-9,NCCIN=94,NCCF=32,IGEN=4,ZG=68
 &END
 &SKIN
 GI1=.973,GI2=.0079,GI3=.0060858
 &END
24240101
0101 0 0  0102 0 0  0103 0 0  0104 0 0  0105 0 0  0106 0 0  0107 0 0  0108 0 0
0109 0 0  0110 0 0  0111 0 0  0112 0 0  0103 0 0  0114 0 0  0115 0 0  0116 0 0
0117 0 0  0118 0 0  0119 0 0  0120 0 0  0121 0 0  0122 0 0  0123 0 0  0124 0 0
      DATA BUS SIMULATION OF A 68 OHM TWISTED SHIELDED PAIR
CASE NUMBER 4
   TIME IN SEC
   TOTAL INPUT
   TOTAL OUTPUT
   FIL(2)
   FIL(3)
   STUB(3)
   FIL(4)
   STUB(4)
   FIL(6)
   STUB(6)
   FIL(8)
   STUB(8)
   FIL(10)
   STUB(10)
   FIL(12)
   FIL(22)
   STUB(22)
   FIL(24)
   STUB(24)
   FIL(26)
   STUB(26)
   FIL(28)
   STUB(28)
   GENERATOR
BEGINNING OF JOB
 $SECT
 T=13.3E-9,CCMAX=350,ZX=112.,LENGT=120*10,K250=0.892,K1500=0.9357
 ALPHA=.0085,R(30,4)=0.0,R(31,4)=0.0,Z0=68.,ZL=31*2200.$
 &END
 &TRAN1
 GAIN1=0.26767,WNSQ1=4.953E14,TWOZW1=8E6
 &END
 &TRAN2
 GAIN2=0.247218,ROOT2=2E7
 &END
 &GENXFR
 GAIN3=0.38,POLE=8.9E6,REF1=-.066
 &END
 &STUB
 NPSKIP=2,
 ISTUB=0,0,0,1,0,1,0,1,0,1,11*0,1,0,1,0,1,0,1,0,0,0
 LSTUB=0,0,0,10,0,10,0,10,0,10,11*0,10,0,10,0,10,0,10,0,0,0
 &END
 &GENER
```

```
 GENMAX=1.0,TSLOPE=50.E-9,NCCIN=94,NCCF=32,IGEN=0,ZG=68
 &END
 &SKIN
 GI1=.973,GI2=.0079,GI3=.0060858
 &END
24240101
0101 0 0  0102 0 0  0103 0 0  0104 0 0  0105 0 0  0106 0 0  0107 0 0  0108 0 0
0109 0 0  0110 0 0  0111 0 0  0112 0 0  0103 0 0  0114 0 0  0115 0 0  0116 0 0
0117 0 0  0118 0 0  0119 0 0  0120 0 0  0121 0 0  0122 0 0  0123 0 0  0124 0 0
      DATA BUS SIMULATION OF A 68 OHM TWISTED SHIELDED PAIR
CASE NUMBER 5
   TIME IN SEC
   TOTAL INPUT
   TOTAL OUTPUT
   FIL(2)
   FIL(3)
   STUB(3)
   FIL(4)
   STUB(4)
   FIL(6)
   STUB(6)
   FIL(8)
   STUB(8)
   FIL(10)
   STUB(10)
   FIL(12)
   FIL(22)
   STUB(22)
   FIL(24)
   STUB(24)
   FIL(26)
   STUB(26)
   FIL(28)
   STUB(28)
   GENERATOR
BEGINNING OF JOB
 &SECT
 T=13.3E-9,CCMAX=350,ZX=112.,LENGT=120*10,K250=0.892,K1500=0.9357
 ALPHA=.0085,R(30,4)=0.0,R(31,4)=0.0,Z0=68.,ZL=31*2200.
 &END
 &TRAN1
 GAIN1=.58851,WNSQ1=4.5E16,TWOZW1=9E8
 &END
 &TRAN2
 GAIN2=0.2617,ROOT2=2E7
 &END
 &GENXFR
 GAIN3=0.38,POLE=8.9E6,REF1=-.153
 &END
 &STUB
 NPSKIP=2,
 ISTUB=0,0,1,28*0
 LSTUB= 0,0,20,28*0
 &END
 &GENER
 GENMAX=1.0,TSLOPE=50.E-9,NCCIN=94,NCCF=32,IGEN=0,ZG=68
 &END
 &SKIN
 GI1=.973,GI2=.0079,GI3=.0060858
 &END
```

```
24240101
0101 0 0  0102 0 0  0103 0 0  0104 0 0  0105 0 0  0106 0 0  0107 0 0  0108 0 0
0109 0 0  0110 0 0  0111 0 0  0112 0 0  0103 0 0  0114 0 0  0115 0 0  0116 0 0
0117 0 0  0118 0 0  0119 0 0  0120 0 0  0121 0 0  0122 0 0  0123 0 0  0124 0 0
      DATA BUS SIMULATION OF A 68 OHM TWISTED SHIELDED PAIR
CASE NUMBER 6
   TIME IN SEC
   TOTAL INPUT
   TOTAL OUTPUT
   FIL(2)
   FIL(3)
   STUB(3)
   FIL(4)
   STUB(4)
   FIL(6)
   STUB(6)
   FIL(8)
   STUB(8)
   FIL(10)
   STUB(10)
   FIL(12)
   FIL(22)
   STUB(22)
   FIL(24)
   STUB(24)
   FIL(26)
   STUB(26)
   FIL(28)
   STUB(28)
   GENERATOR
BEGINNING OF JOB
 &SECT
 I=13.3E-9,CCMAX=350,ZX=112.,LENGT=120*10,K250=0.892,K1500=0.9357
 ALPHA=.0085,R(30,4)=0.0,P(31,4)=0.0,Z0=68.,ZL=31*2200.
 &END
 &TRAN1
 GAIN1=.58851,WNSQ1=2.8E15,TWOZW1=9E7
 &END
 &TRAN2
 GAIN2=0.2617,ROOT2=2E7
 &END
 &GENXFR
 GAIN3=0.233,POLE=8.9E7,REF1=-.153
 &END
 &STUB
 NPSKIP=2,
 ISTUB=0,0,0,1,0,1,0,1,0,1,11*0,1,0,1,0,1,0,1,0,0,0
 LSTUB=0,0,0,10,0,10,0,10,0,10,11*0,10,0,10,0,10,0,10,0,0,0
 &END
 &GENER
 GENMAX=1.0,ISLOPE=50.E-9,NCCIN=94,NCCF=32,IGEN=4,ZG=68
 &END
 &SKIN
 GI1=.973,GI2=.0079,GI3=.0060858
 &END
24240101
0101 0 0  0102 0 0  0103 0 0  0104 0 0  0105 0 0  0106 0 0  0107 0 0  0108 0 0
0109 0 0  0110 0 0  0111 0 0  0112 0 0  0103 0 0  0114 0 0  0115 0 0  0116 0 0
0117 0 0  0118 0 0  0119 0 0  0120 0 0  0121 0 0  0122 0 0  0123 0 0  0124 0 0
      DATA BUS SIMULATION OF A 68 OHM TWISTED SHIELDED PAIR
```

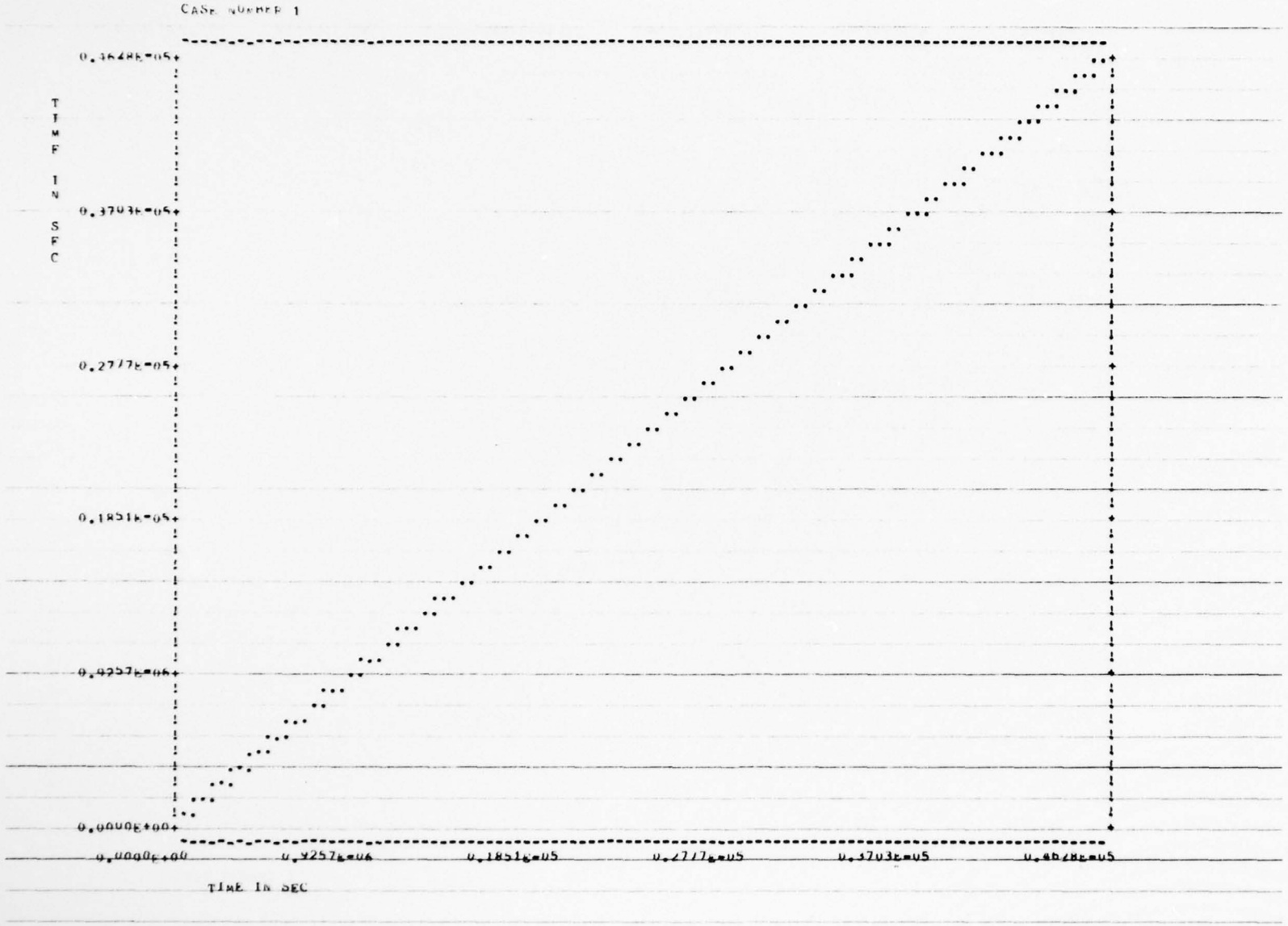
```
CASE NUMBER 7
   TIME IN SEC
   TOTAL INPUT
   TOTAL OUTPUT
   FIL(2)
   FIL(3)
   STUB(3)
   FIL(4)
   STUB(4)
   FIL(6)
   STUB(6)
   FIL(8)
   STUB(8)
   FIL(10)
   STUB(10)
   FIL(12)
   FIL(22)
   STUB(22)
   FIL(24)
   STUB(24)
   FIL(26)
   STUB(26)
   FIL(28)
   STUB(28)
   GENERATOR
EOJ
```

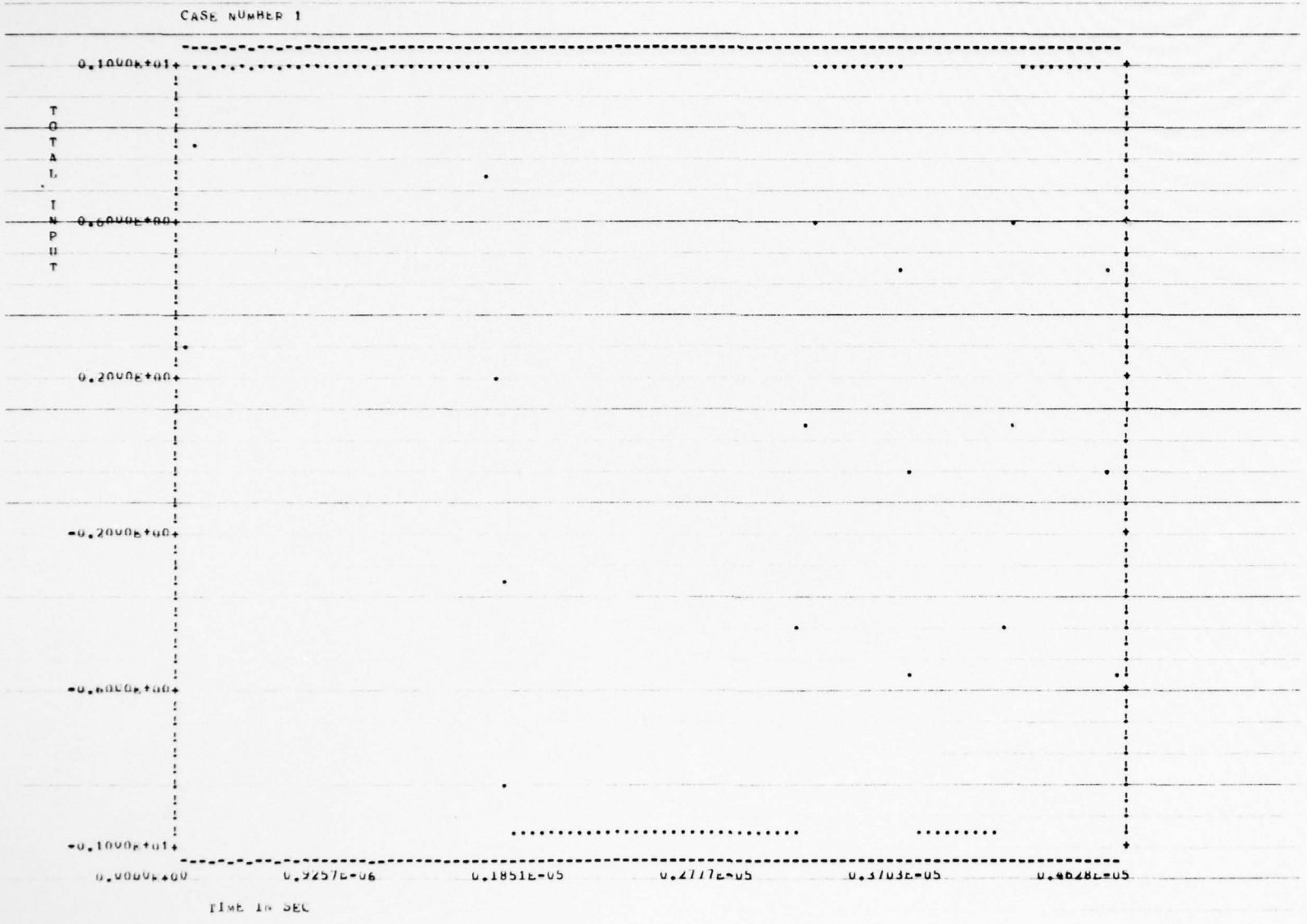
APPENDIX C

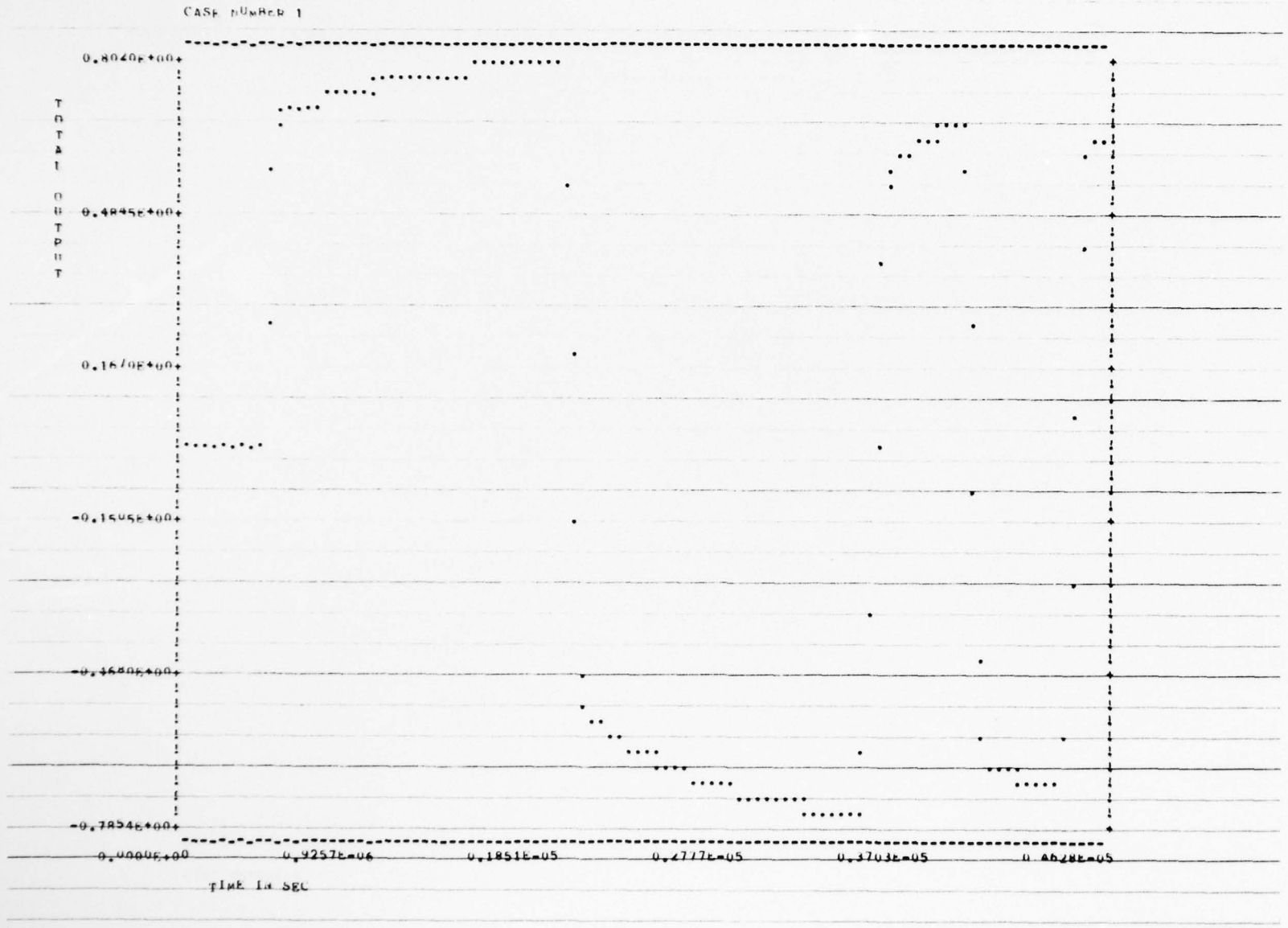
PROGRAM OUTPUT

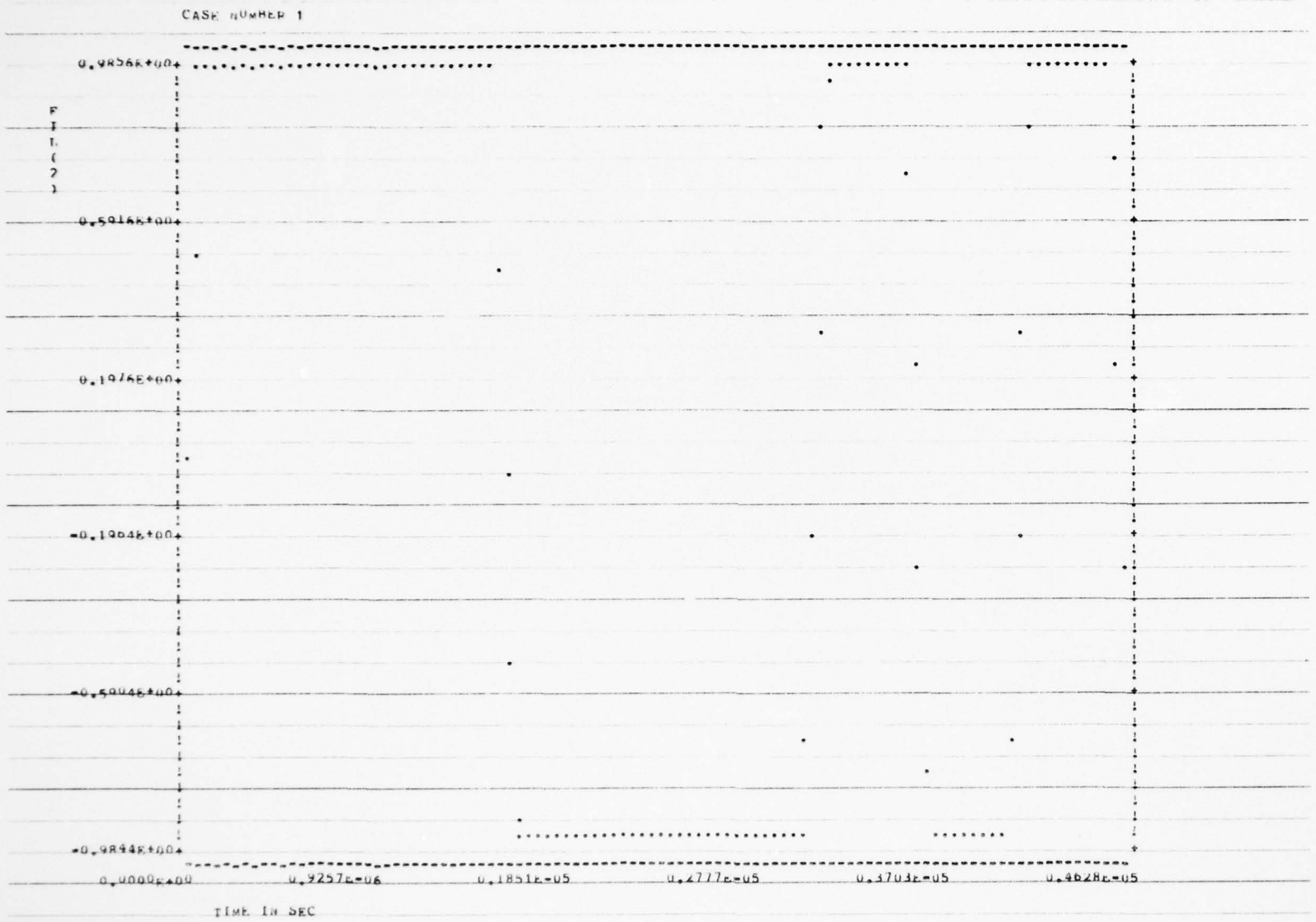
```
 NEW JOB BEGINNING

 SECT pA14  .0000001330   350.0   112.0   16.0   0.89200  0.93570  0.00850  0.00000  0.00000 88.00000  2200.000
 $TRAN1
  GAIN1=  0.2675700    , ANSG1=  0.4953000E+15,  TWOZ1=   8000000.    , $
 $TRAN2
  GAIN2=  0.2472180    , ANOIZ=  0.2000000E+08, $
 $GENXER
  GAIN3=  0.3860000    , FOLE=   8000000.    , PER1= -0.6600000E-01, $
 $STUB
  ISTUB=31*              0,  NPSNIP=              2,  LSTOB=31*              0, $
 $GENER
  IGEN=                  0,  GENMAA=   1.000000    , ISLOPE=  0.5000000E+07,  NCCIN=            115,  NCCF=             38,
  ZC=   68.00000    , $
 $SKIN
  GT1=  0.9730000    , GT2=  0.7900000E-02,  GT3=  0.6085800E-02, $

 PLOTER CALLED. 24 VARIABLES SPECIFIED. 24 PLOTS REQUESTED.
```

DATA BUS SIMULATION OF A 68 OHM TWISTED SHIELDED PAIR


CASE NUMBER 1
TIME IN SEC
0.0000E+00
0.9257E+04
0.1851E+05
0.2777E+05
0.3703E+05
0.4628E+05
TIME IN SEC


CASE NUMBER 1
0.1000E+01
0.6000E+00
0.2000E+00
-0.2000E+00
-0.6000E+00
-0.1000E+01
TOTAL INPUT
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC


CASE NUMBER 1
TOTAL OUTPUT
0.8040E+00
0.4845E+00
0.1670E+00
-0.1505E+00
-0.4680E+00
-0.7854E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC


CASE NUMBER 1
0.9856E+00
0.5916E+00
0.1976E+00
-0.1984E+00
-0.5904E+00
-0.9844E+00
F
I
(
2
)
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

AD-A041 418 AIR FORCE AVIONICS LAB WRIGHT-PATTERSON AFB OHIO F/G 9/2
A USERS GUIDE TO THE DATA BUS NETWORK SIMULATOR (DBNS) PROGRAM.(U)
APR 77 J E CAMP

UNCLASSIFIED AFAL-TR-77-47 NL

2 OF 3
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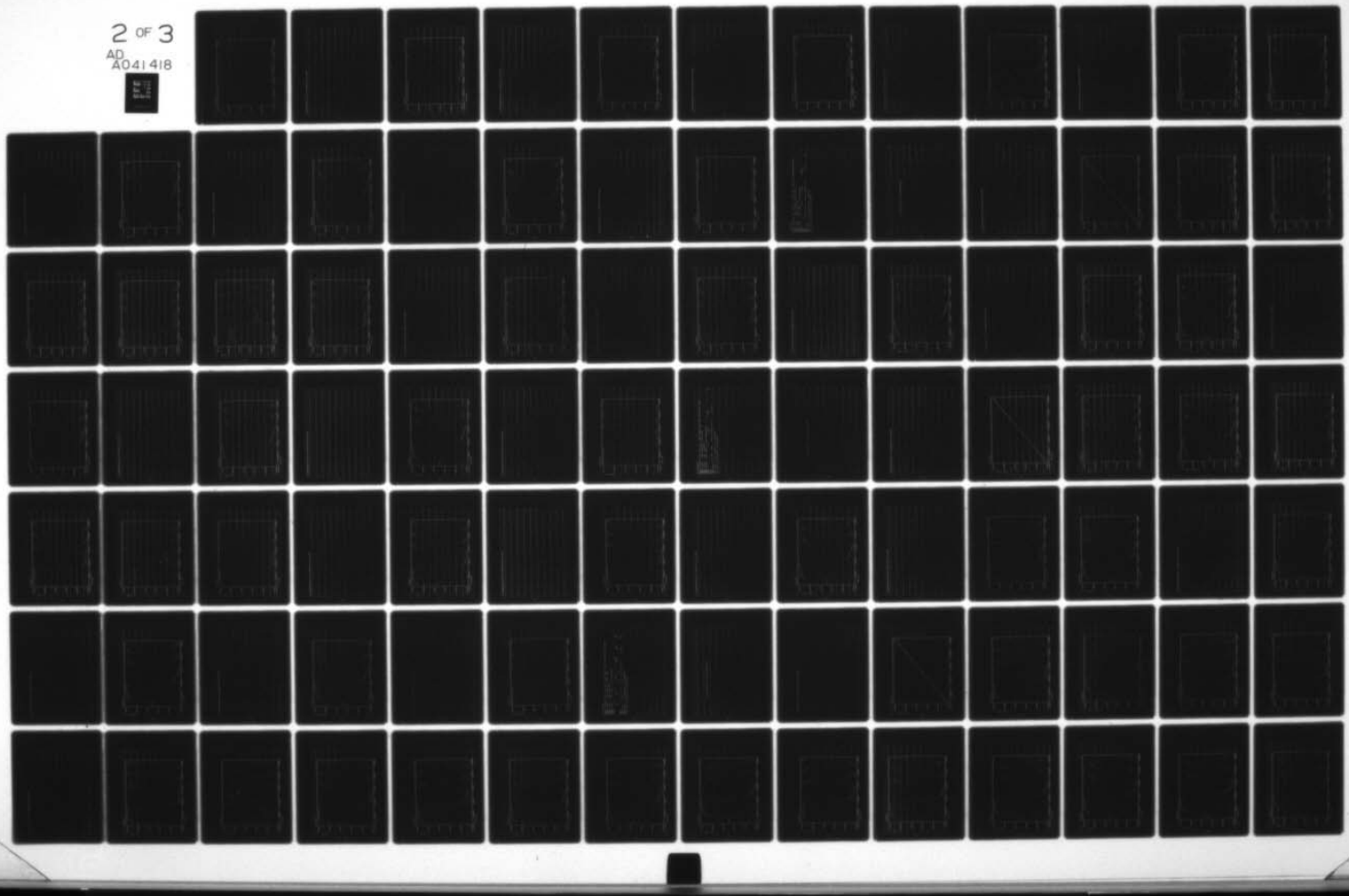
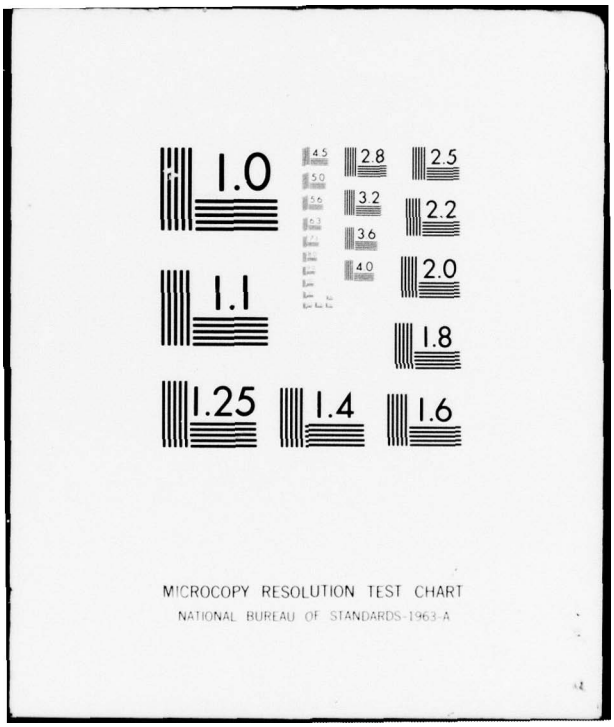
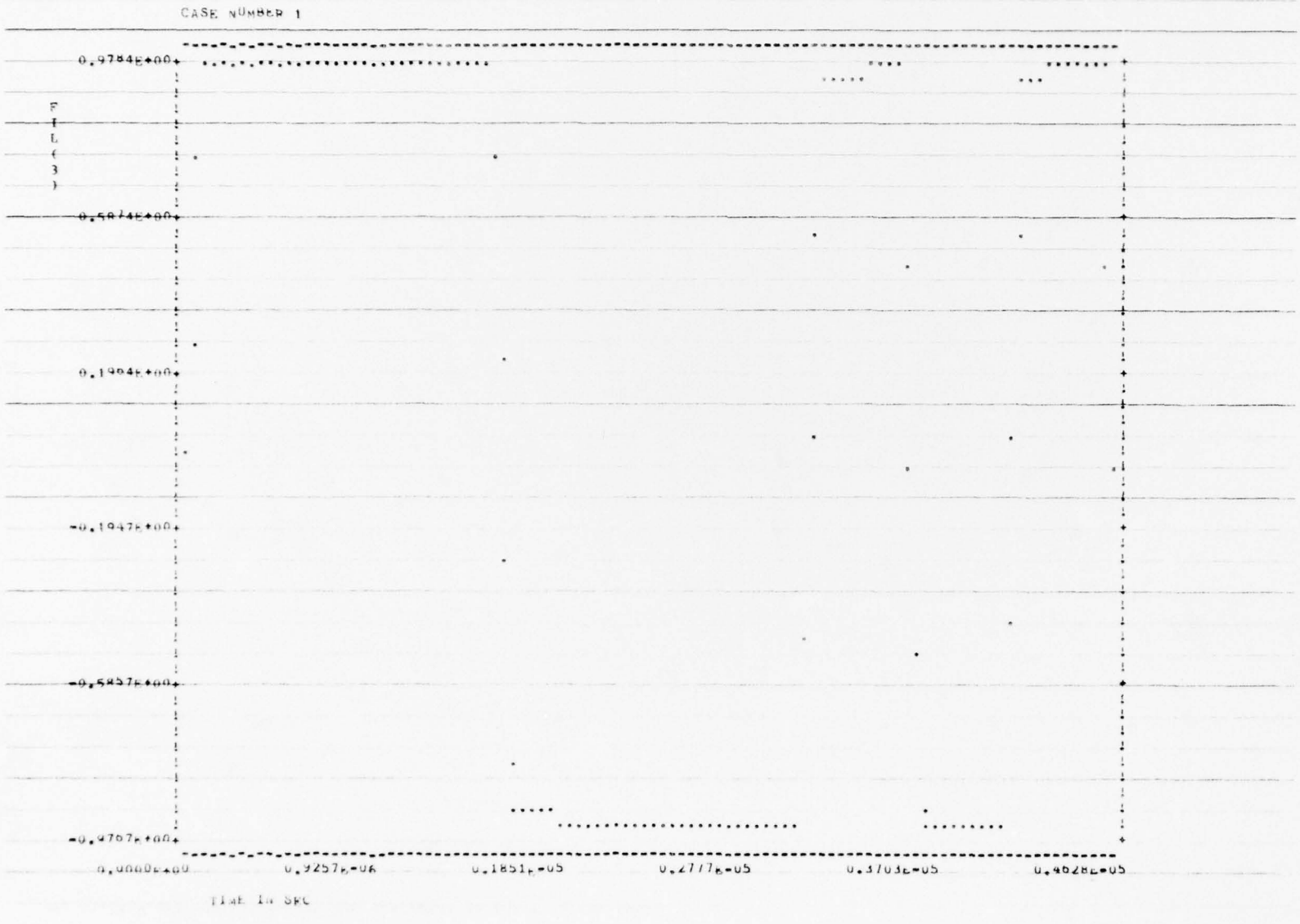
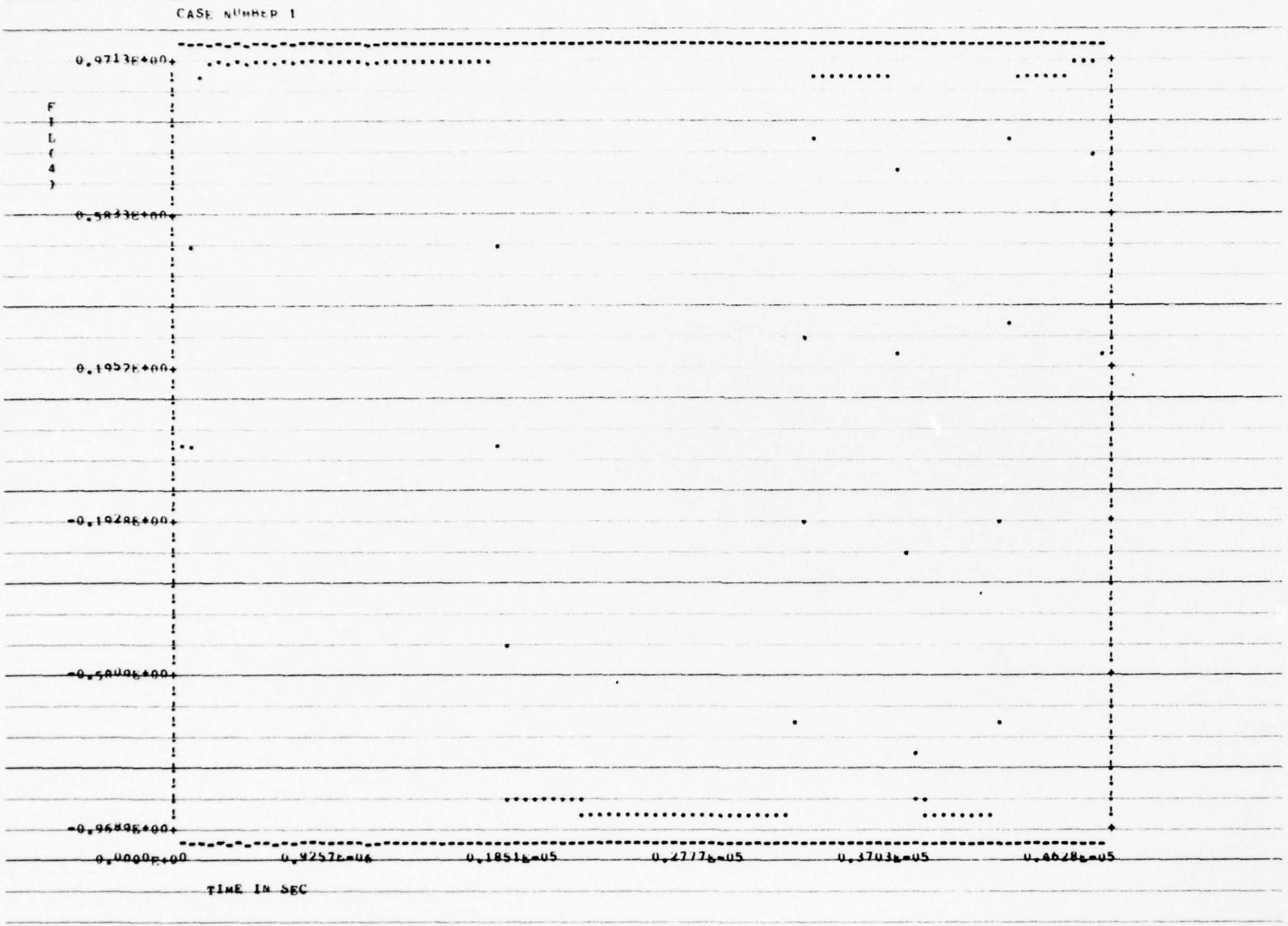


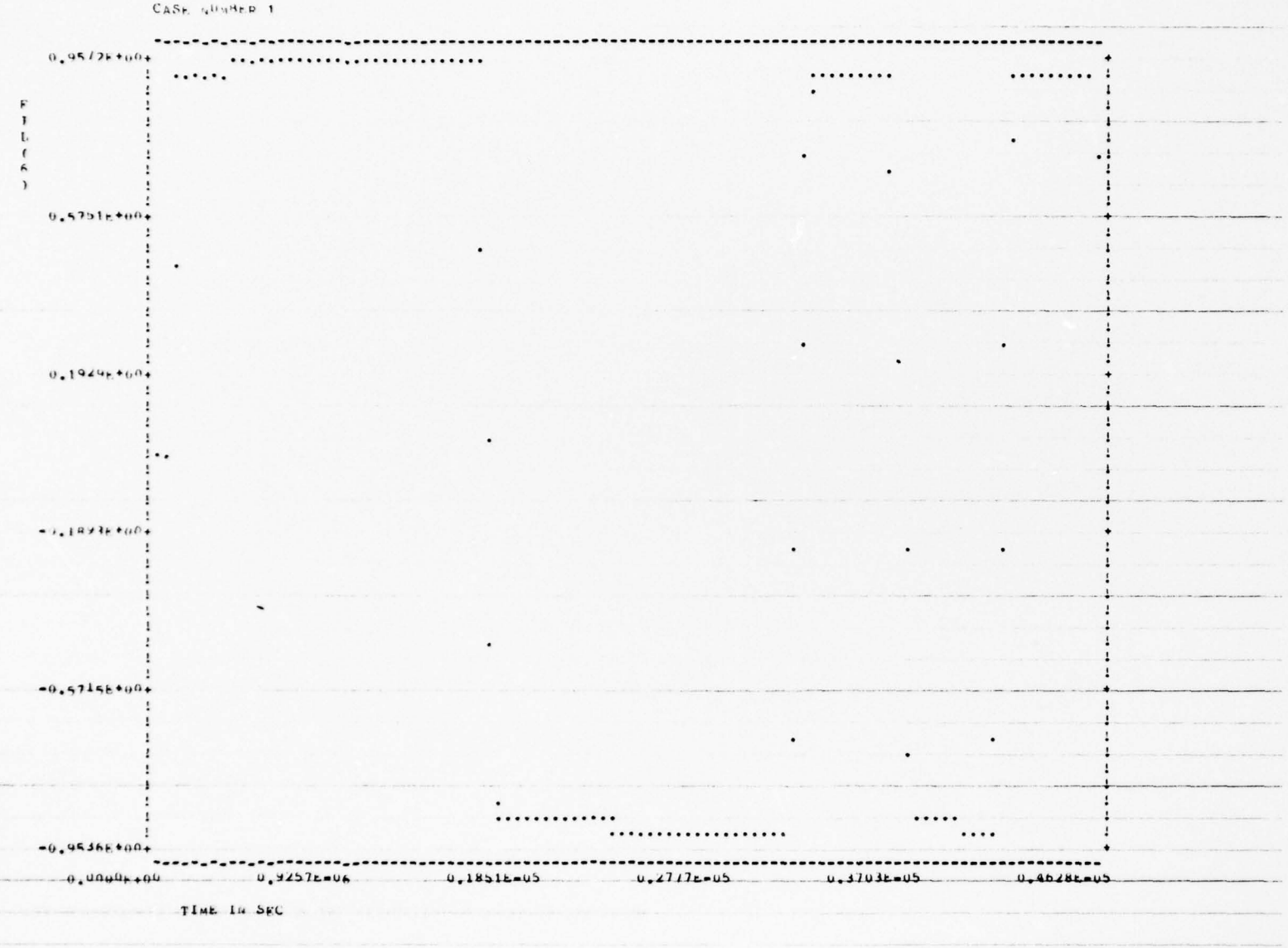

1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
4.5
5.0
5.6
6.3
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A


CASE NUMBER 1
0.9784E+00
0.5874E+00
0.1964E+00
-0.1947E+00
-0.5857E+00
-0.9767E+00
F
(
L
3
)
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

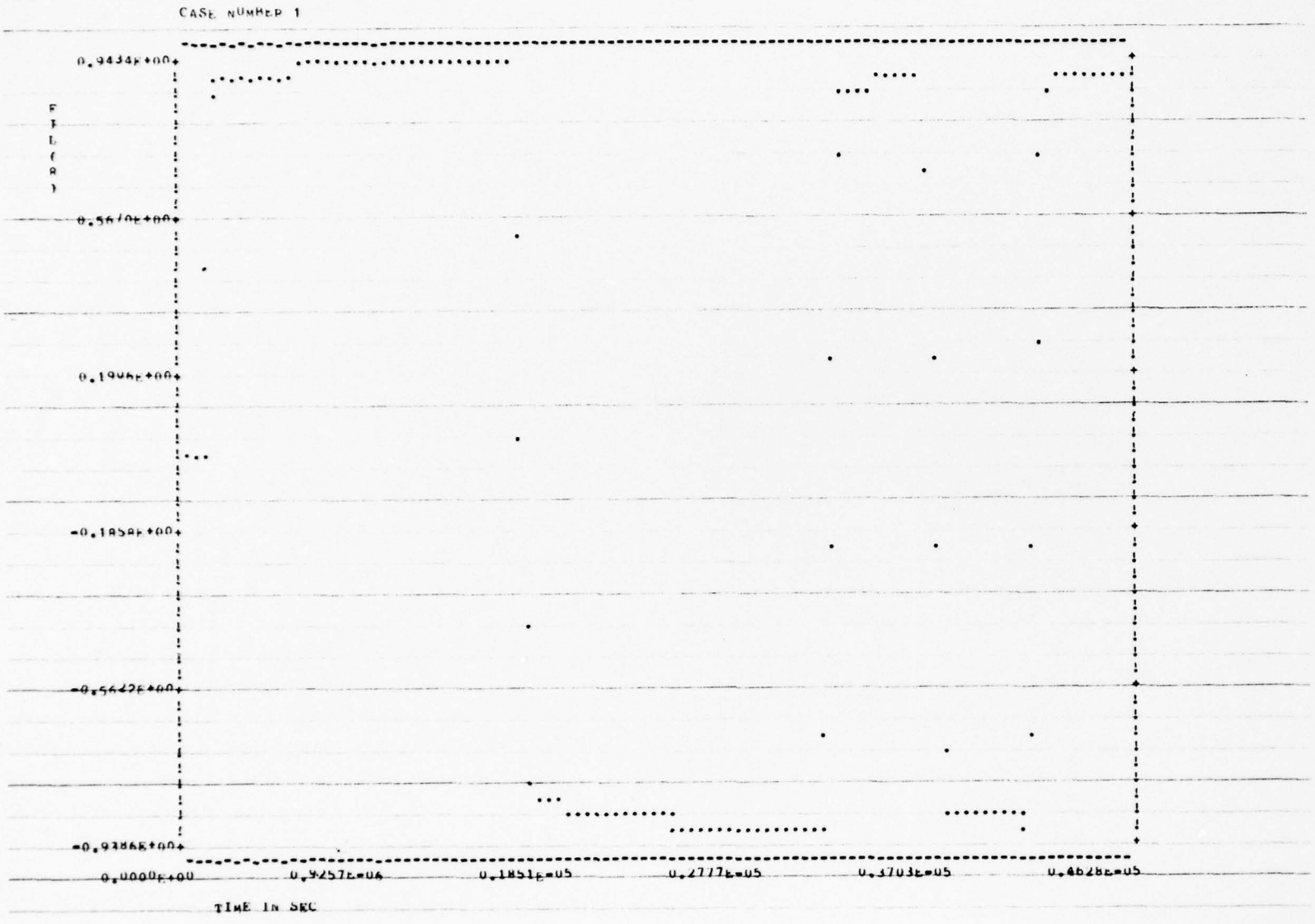
THE MINIMUM-MAXIMUM VALUES FOR THE VARIABLES IN CURVE 6 ARE EQUAL


CASE NUMBER 1
0.9713E+00
F
(
L
f
4
)
0.5833E+00
0.1952E+00
-0.1928E+00
-0.5809E+00
-0.9689E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

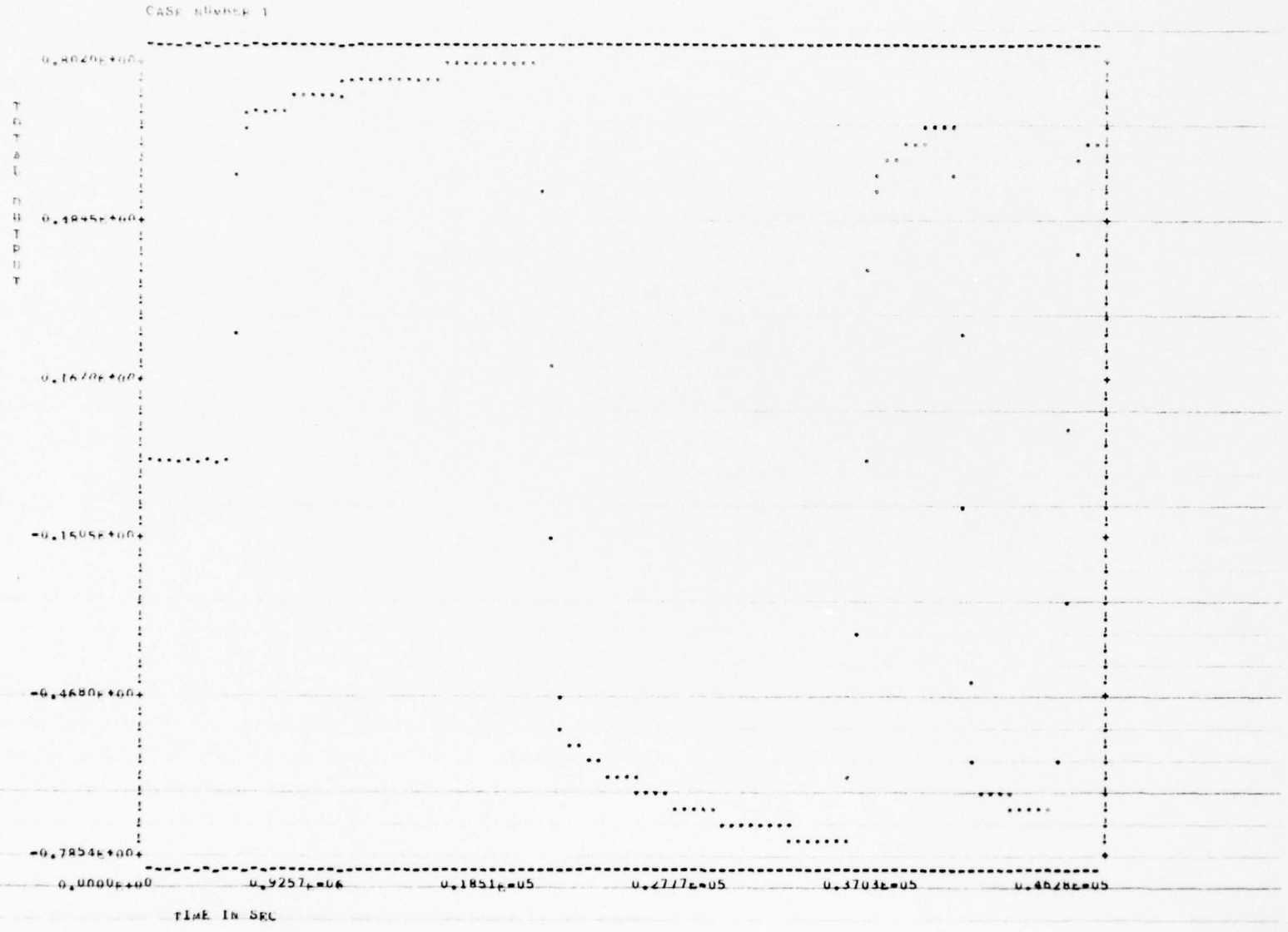
THE MINIMUM-MAXIMUM VALUES FOR THE VARIABLES IN CURVE 8 ARE EQUAL


CASE NUMBER 1
0.9572E+00
0.5751E+00
0.1929E+00
-0.1893E+00
-0.5715E+00
-0.9536E+00
F(t)
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

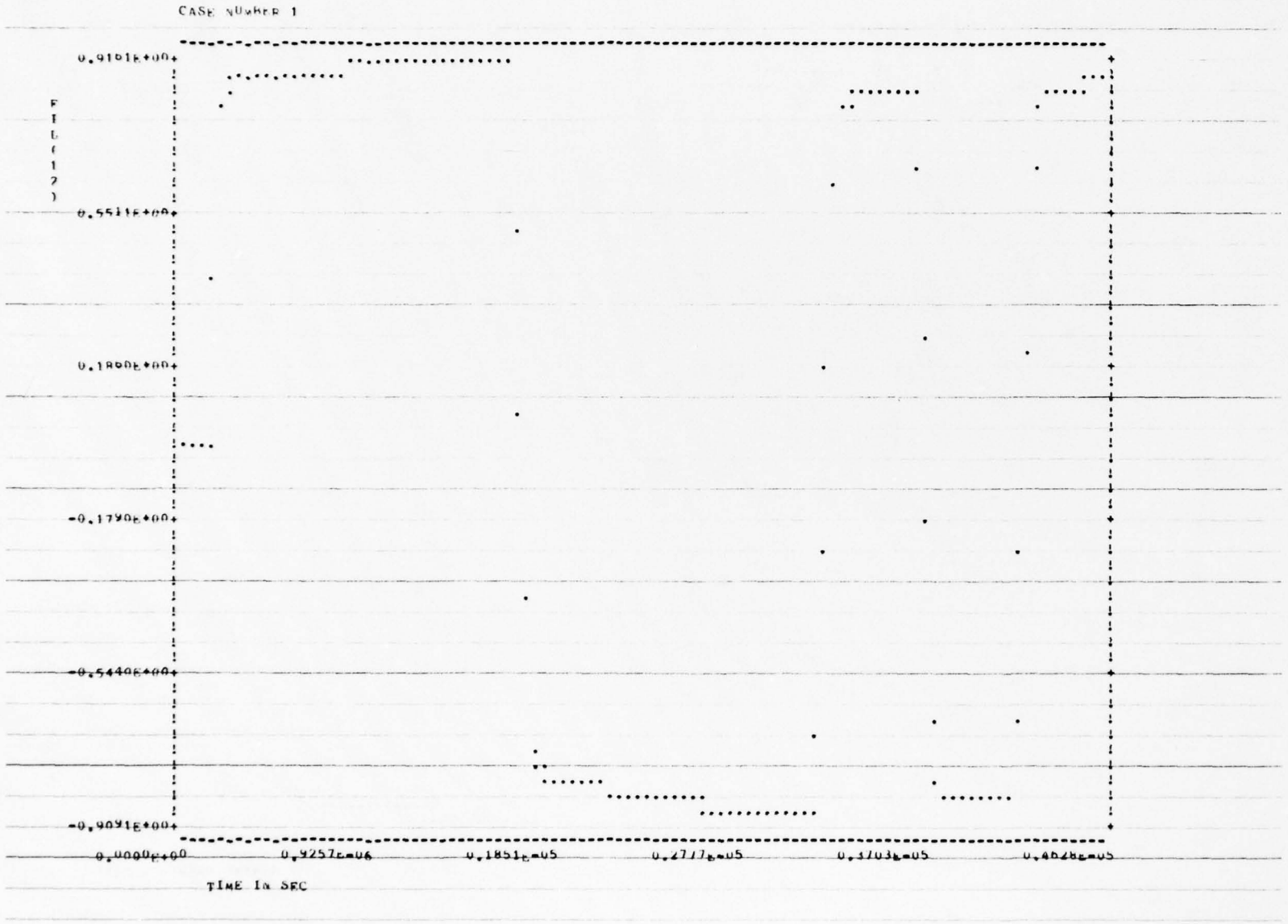
THE MINIMUM-MAXIMUM VALUES FOR THE VARIABLES IN CURVE 10 ARE EQUAL

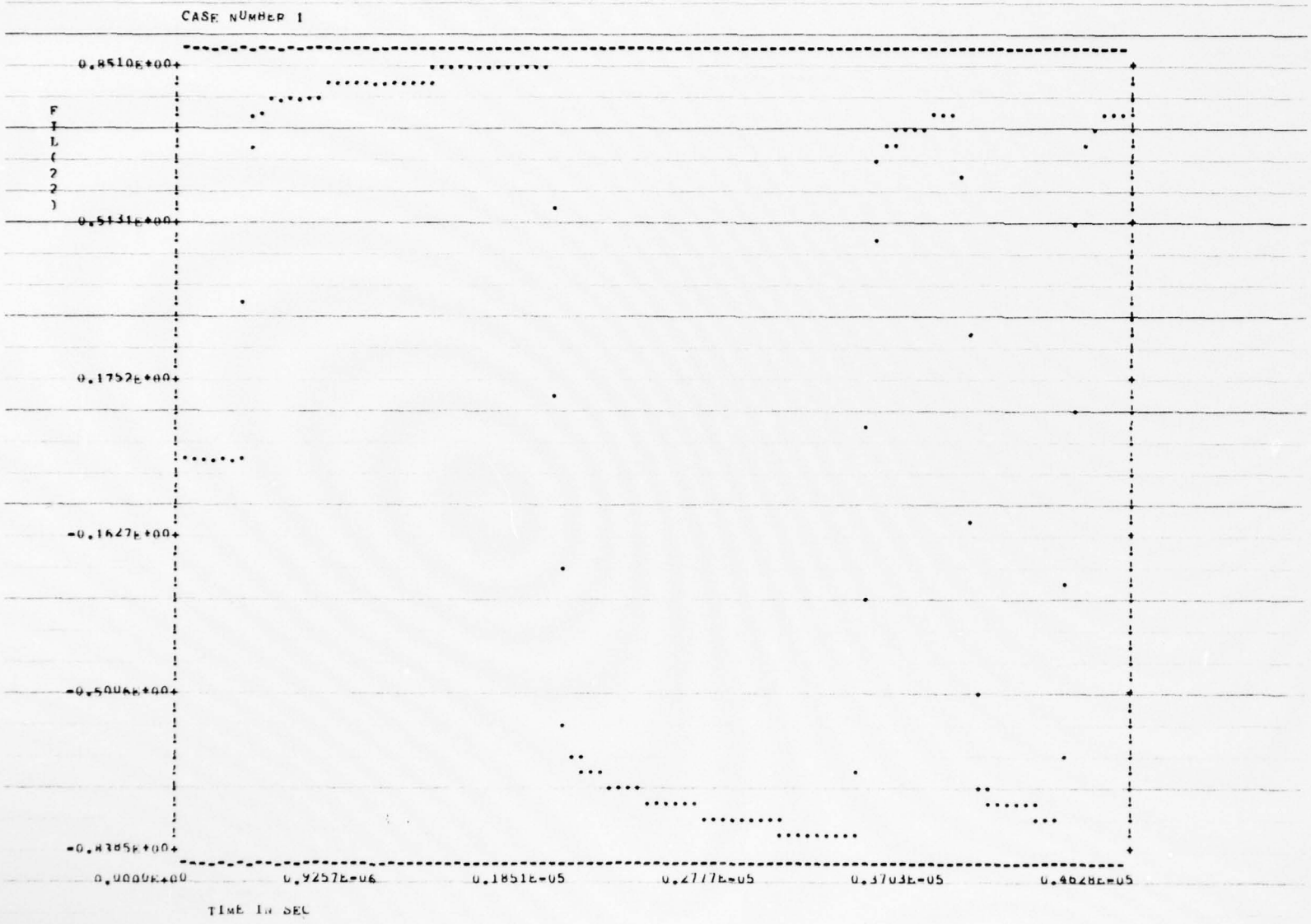

CASE NUMBER 1
0.9434E+00
0.5670E+00
0.1906E+00
-0.1858E+00
-0.5622E+00
-0.9386E+00
F(t)
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

THE MINIMUM-MAXIMUM VALUES FOR THE VARIABLES IN CURVE 12 ARE EQUAL

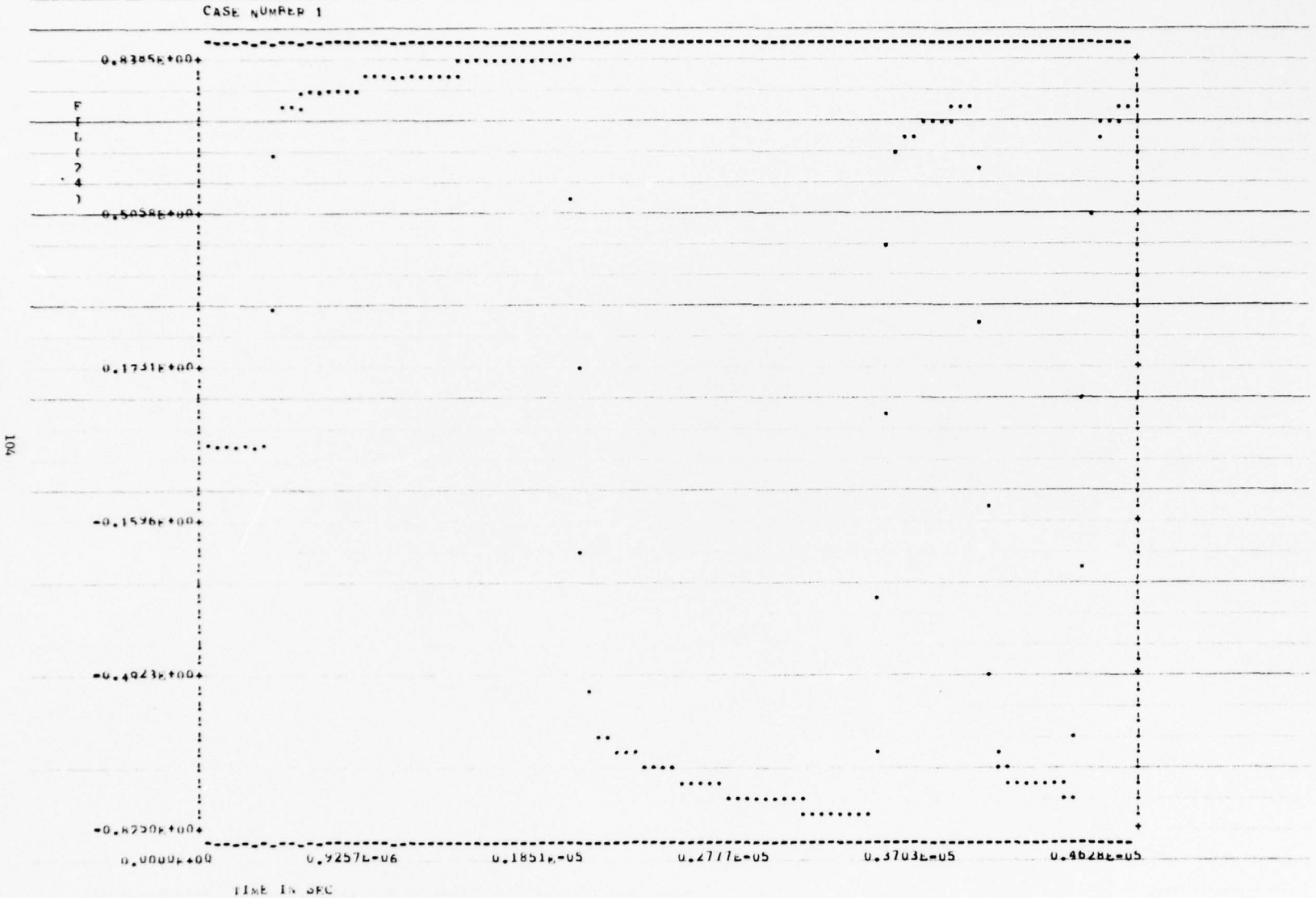

CASE NUMBER 1
TOTAL OUTPUT
0.8047E+00
0.4845E+00
0.1642E+00
-0.1505E+00
-0.4680E+00
-0.7854E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

THE MINIMUM=MAXIMUM VALUES FOR THE VARIABLES IN CURVE 14 ARE EQUAL

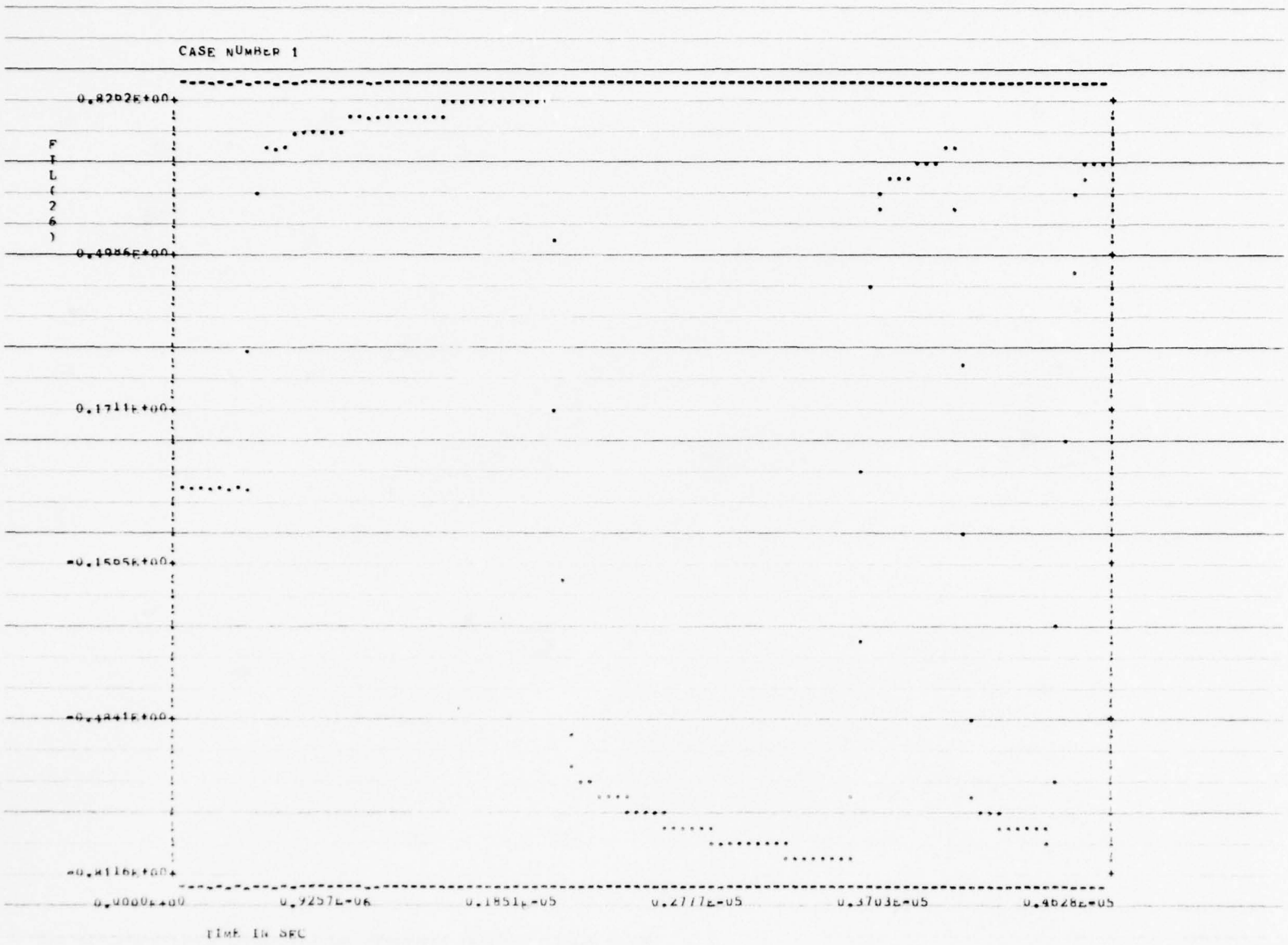

CASE NUMBER 1
0.9101E+00
0.5511E+00
0.1800E+00
-0.1790E+00
-0.5440E+00
-0.9091E+00
F(I,2)
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC


CASE NUMBER 1
0.8510E+00
0.1752E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
TIME IN SEC

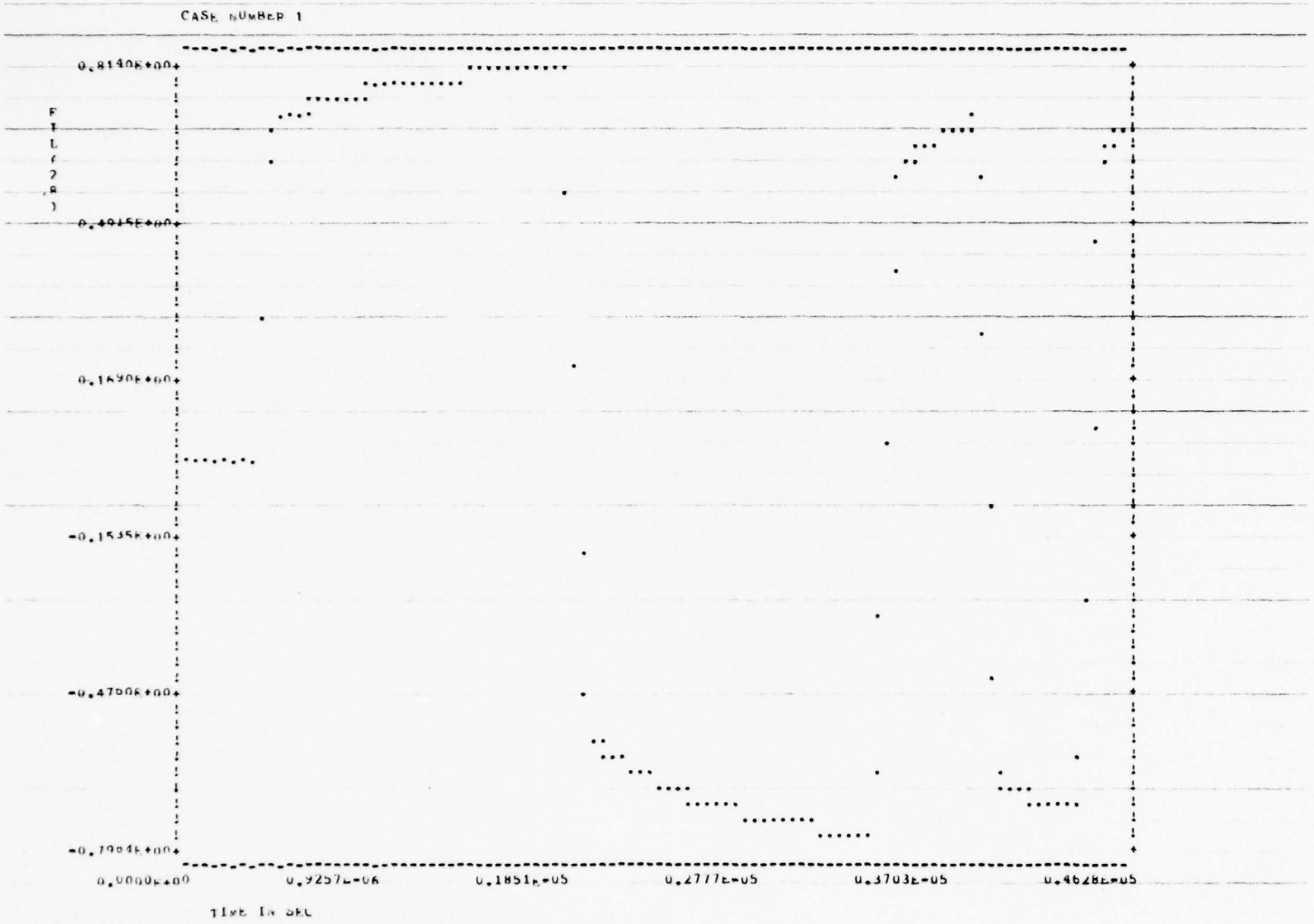
THE MINIMUM-MAXIMUM VALUES FOR THE VARIABLES IN CURVE 17 ARE EQUAL


CASE NUMBER 1
0.8385E+00
0.5058E+00
0.1731E+00
-0.1596E+00
-0.4923E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
TIME IN SEC

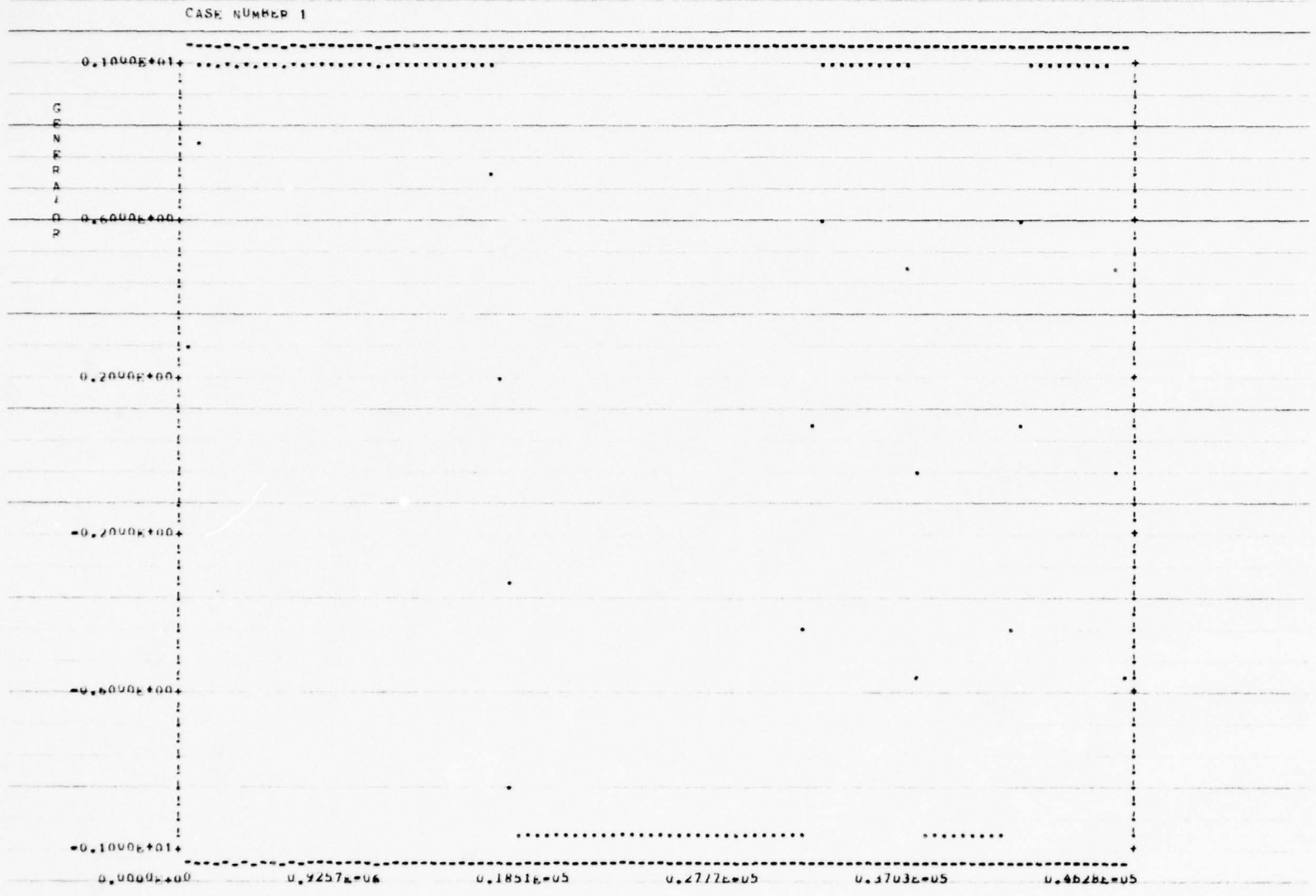
THE MINIMUM-MAXIMUM VALUES FOR THE VARIABLES IN CURVE 19 ARE EQUAL


CASE NUMBER 1
F
L
(
2
6
)
0.8202E+00
0.4986E+00
0.1711E+00
-0.1585E+00
-0.4881E+00
-0.8116E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

THE MINIMUM=MAXIMUM VALUES FOR THE VARIABLES IN CURVE 21 ARE EQUAL


CASE NUMBER 1
0.8140E+00
0.4015E+00
0.1690E+00
-0.1535E+00
-0.4700E+00
-0.7904E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

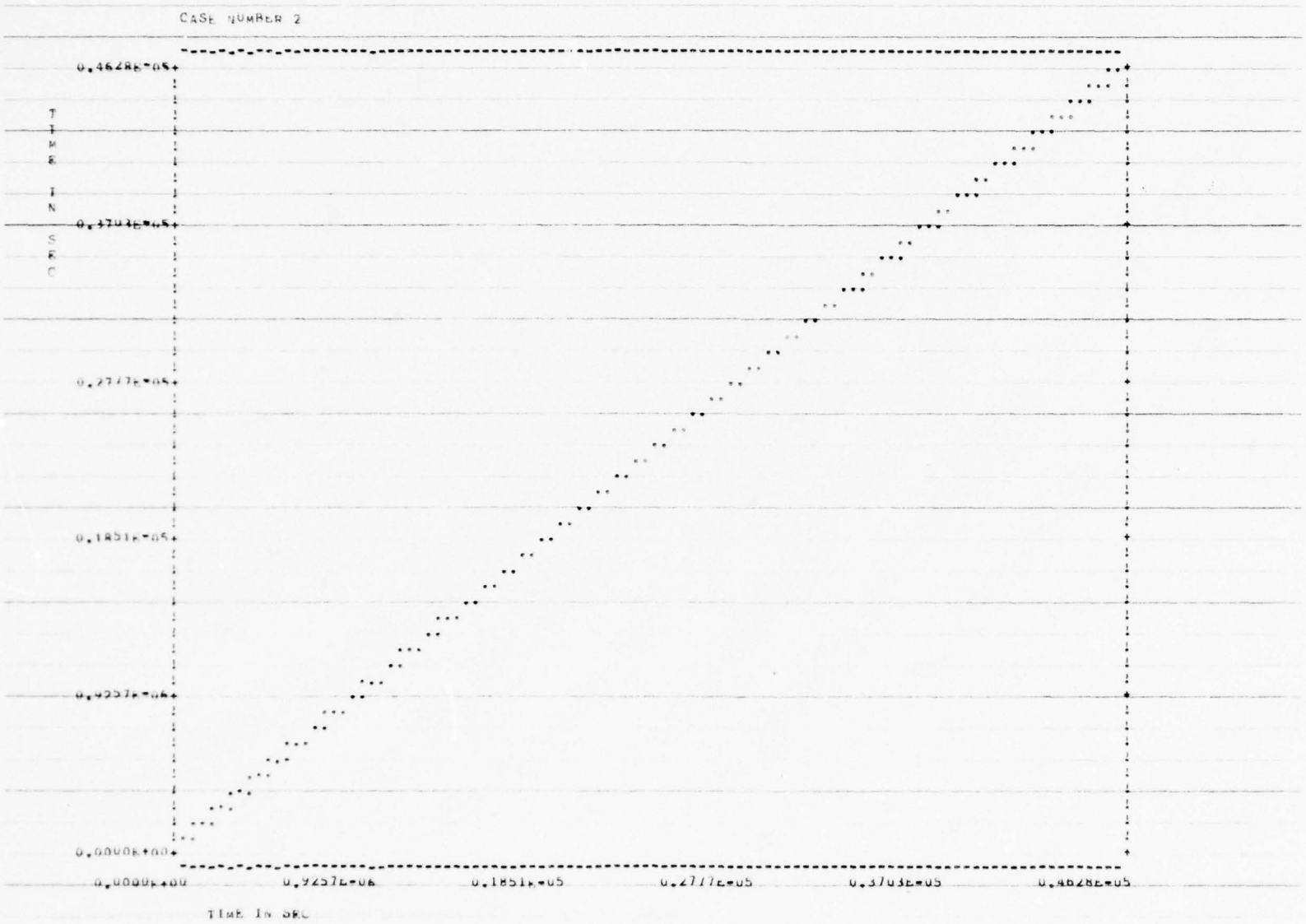
THE MINIMUM-MAXIMUM VALUES FOR THE VARIABLES IN CURVE 23 ARE EQUAL

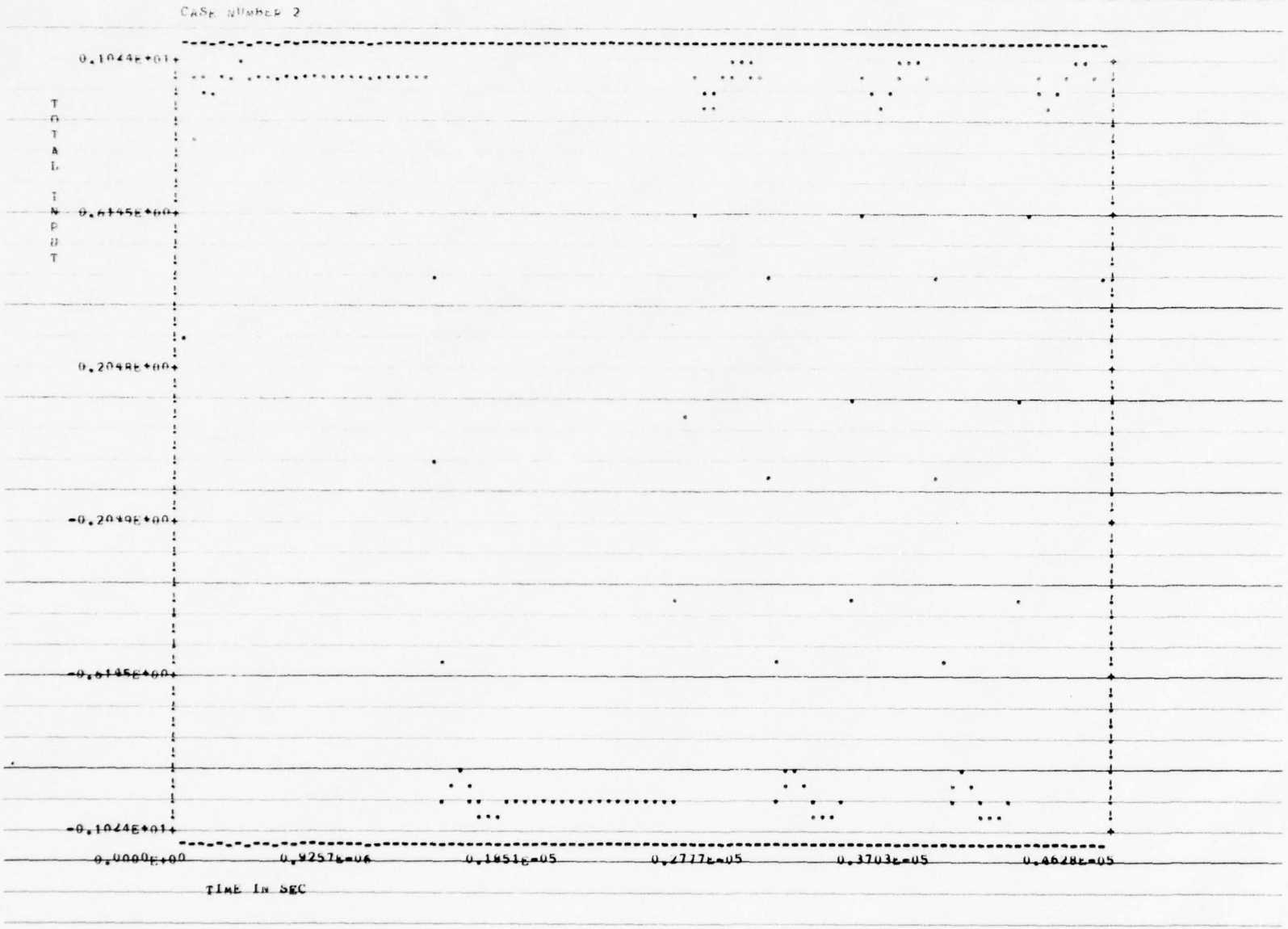

CASE NUMBER 1
0.1000E+01
0.6000E+00
0.2000E+00
-0.2000E+00
-0.6000E+00
-0.1000E+01
GENERATOR
0.0000E+00
0.9257E+04
0.1851E+05
0.2777E+05
0.3703E+05
0.4628E+05
TIME IN SEC

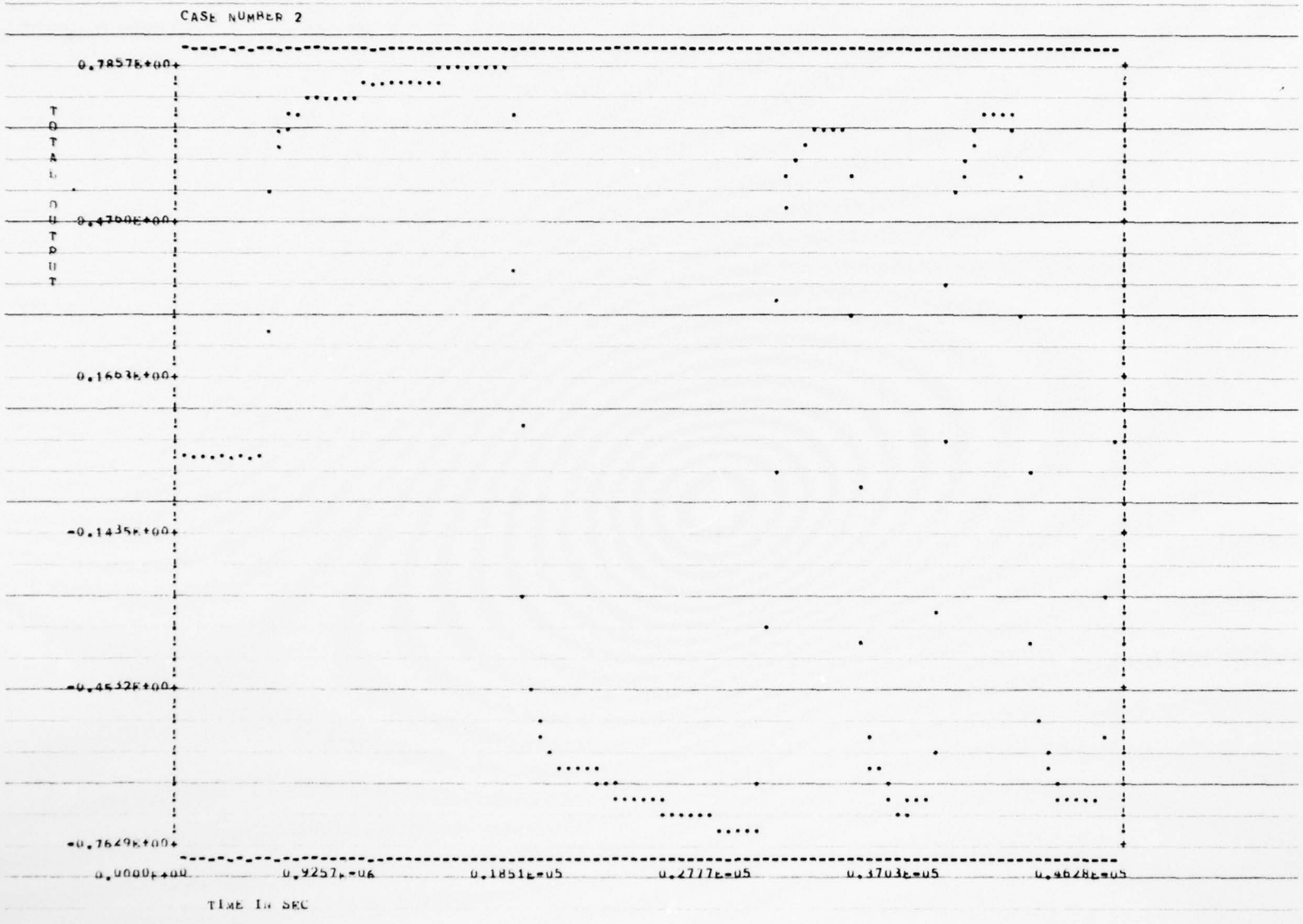
```
NEW JOB BEGINNING

SECT DATA .0000001330   350.0   112.0   10.0    0.89200  0.93570  0.00850  0.00000  0.00000 68.00000  2200.000
STRAN1
 GAIN1=  0.2676706    , ANSG1=  0.4953000E+15,  IWDZW1=   8000000.    , $
STRAN2
 GAIN2=  0.2472180    , RDDL2=  0.2000000E+08, $
SGENXFR
 GAIN3=  0.3860000    , FDLE=   R000000.    , REFI= -0.6600000E-01, $
SSTUB
 ISTUB=2*              0,              1, 28*              0,  NPSKIP=              2,  DSTUB=2*              0,              10,
28*              0, $
SGENFR
 IGEN=              0,  GENMAX=   1.000000    ,  ISLOPE=  0.5000000E-07,  NCCIN=             94,  NCCF=             32,
 ZG=   68.00000    , $
SSKIN
 GI1=  0.9740000    ,  GI2=  0.7900000E-02,  GI3=  0.6085800E-02, $

PLOTFR CALLED. 24 VARIABLES SPECIFIED. 24 PLOTS REQUESTED.
```

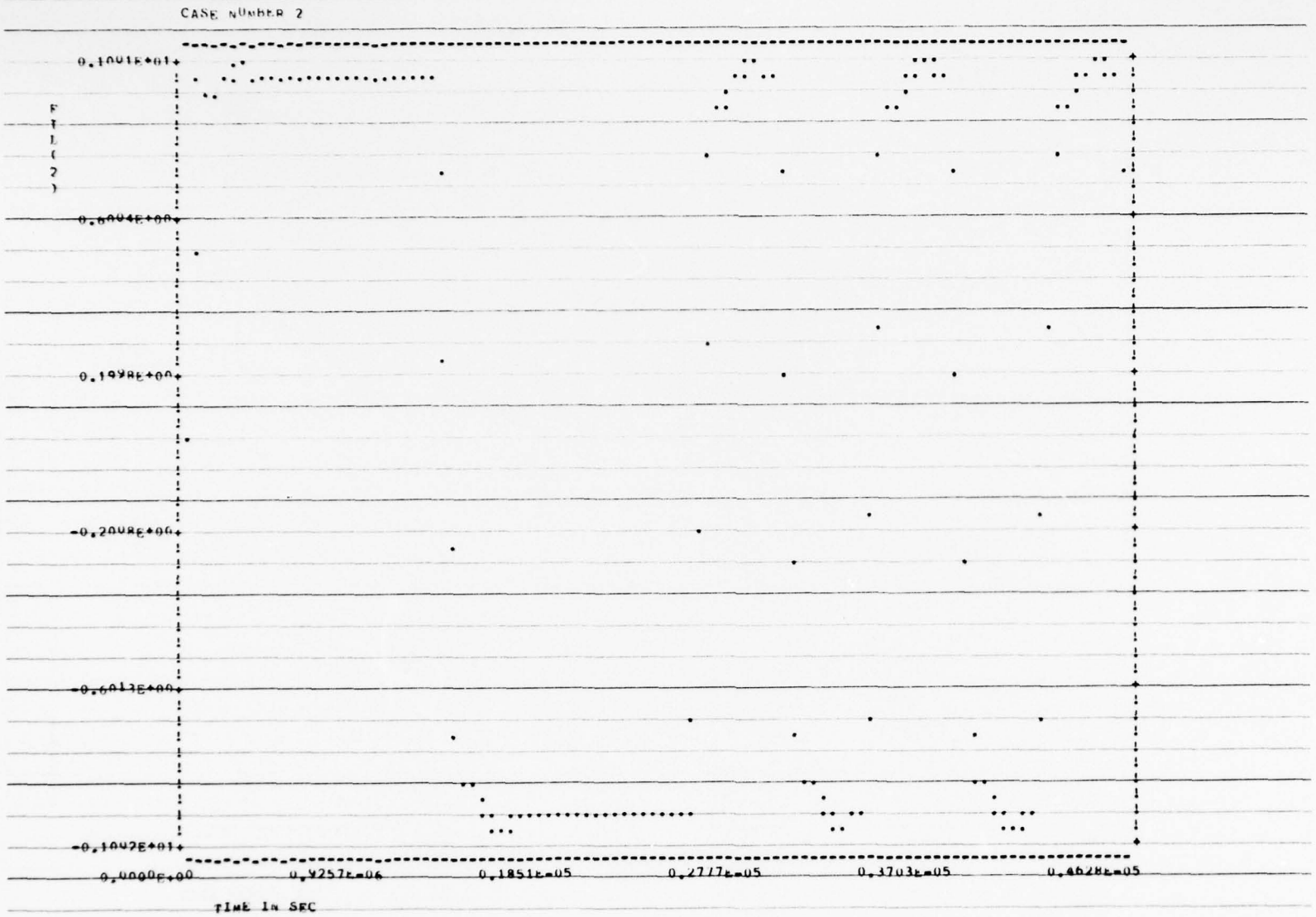
DATA BUS SIMULATION OF A 68 OHM TWISTED SHIELDED PAIR

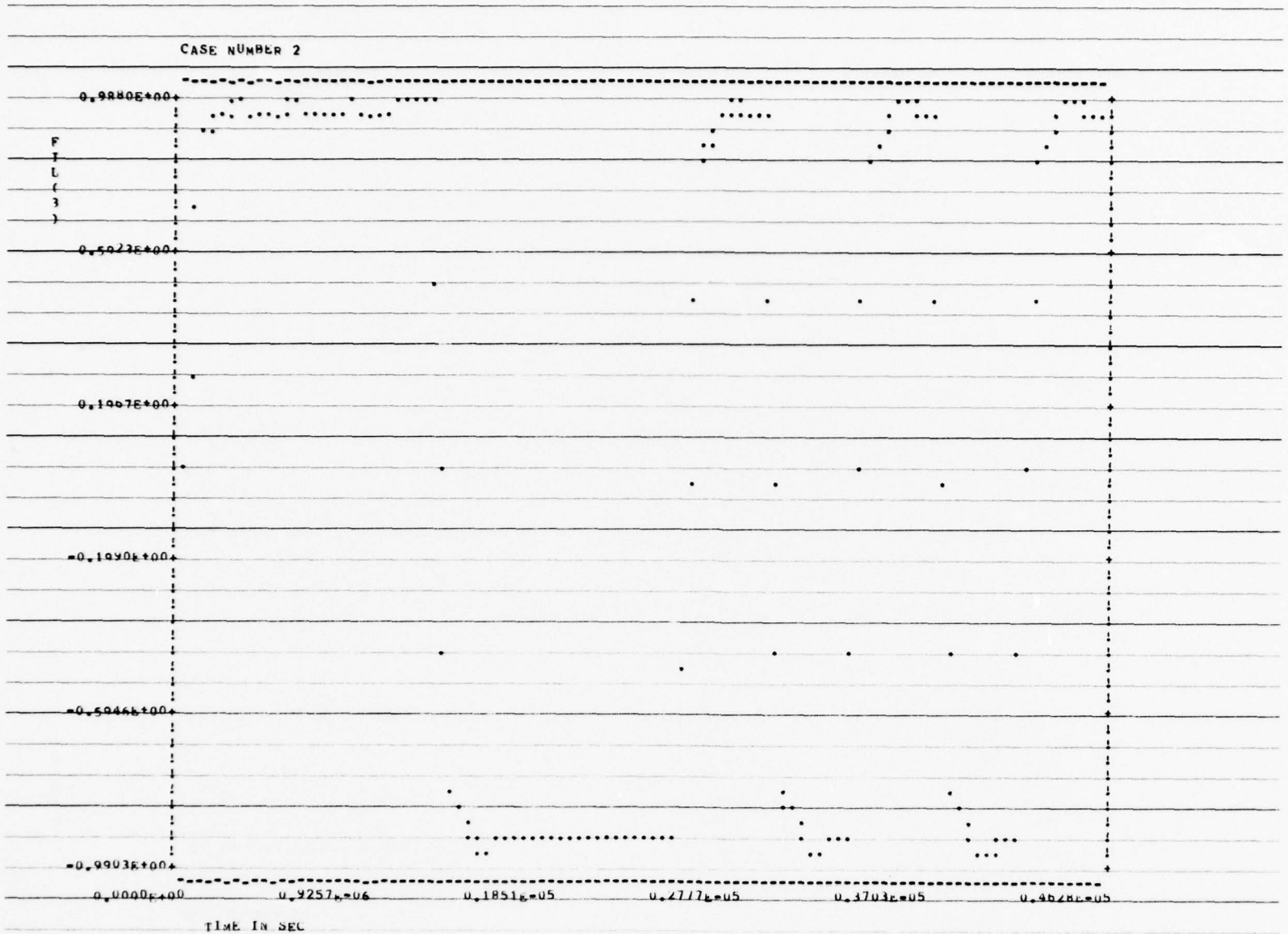
THE MINIMUM-MAXIMUM VALUES FOR THE VARIABLES IN CURVE 23 ARE EQUAL

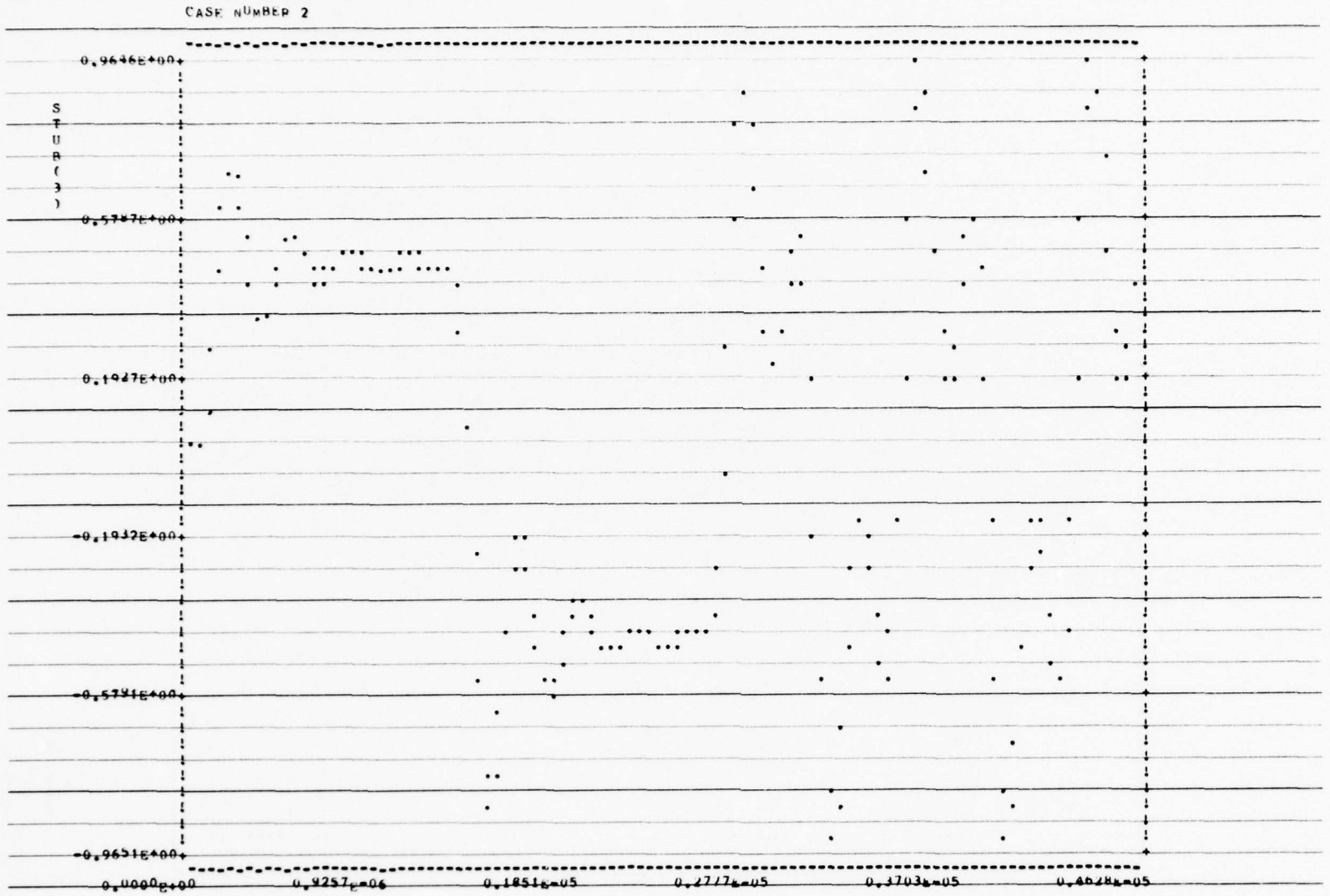

CASE NUMBER 2
TIME IN SEC
0.4628E+05
0.3703E+05
0.2777E+05
0.1851E+05
0.9257E+04
0.0000E+00
0.0000E+00
0.9257E+04
0.1851E+05
0.2777E+05
0.3703E+05
0.4628E+05
TIME IN SEC

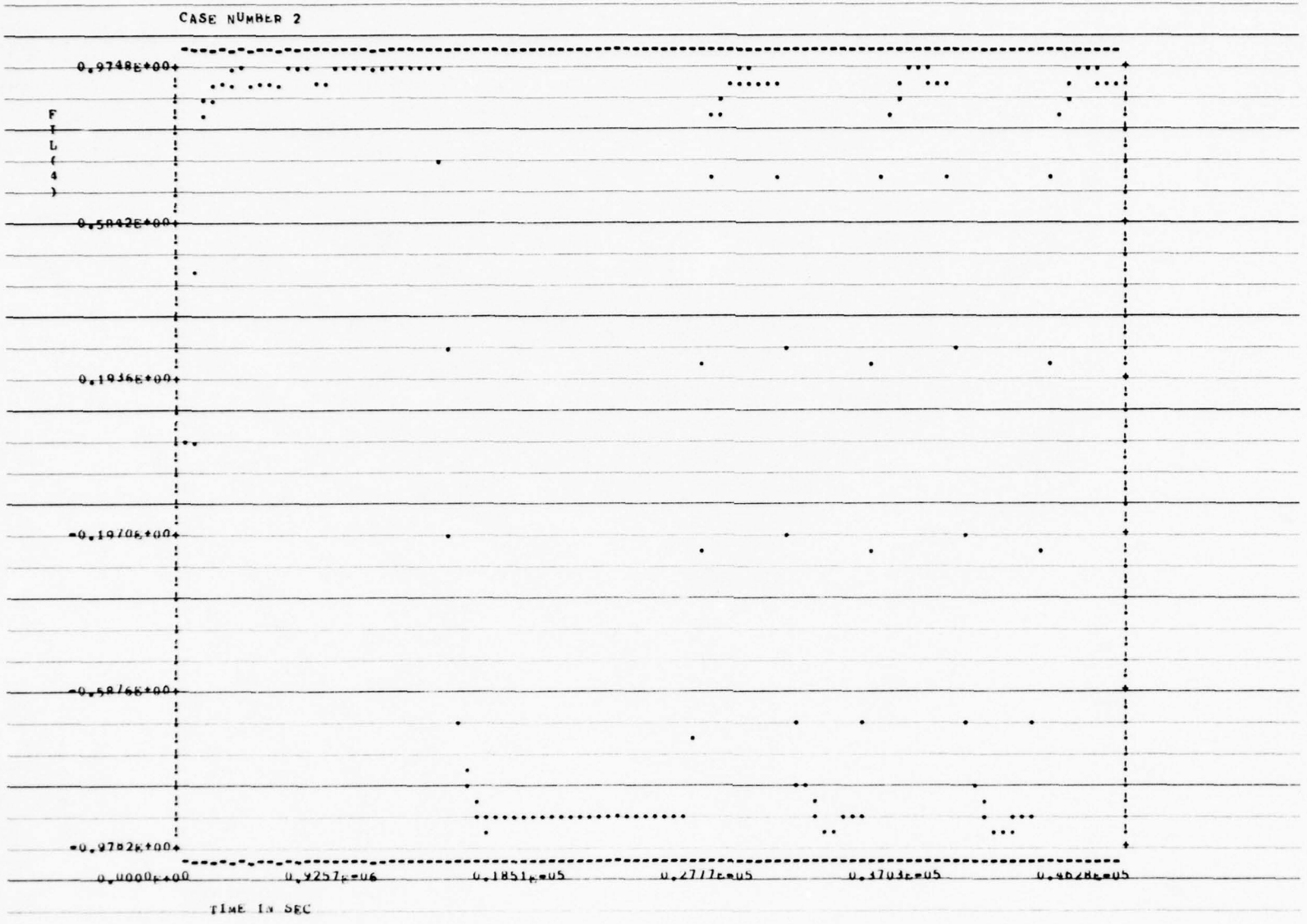

CASE NUMBER 2
0.1044E+01
0.5145E+00
0.2048E+00
-0.2049E+00
-0.5145E+00
-0.1024E+01
TOTAL INPUT
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC


CASE NUMBER 2
0.7857E+00
0.4390E+00
0.1693E+00
-0.1435E+00
-0.4632E+00
-0.7829E+00
TOTAL OUTPUT
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

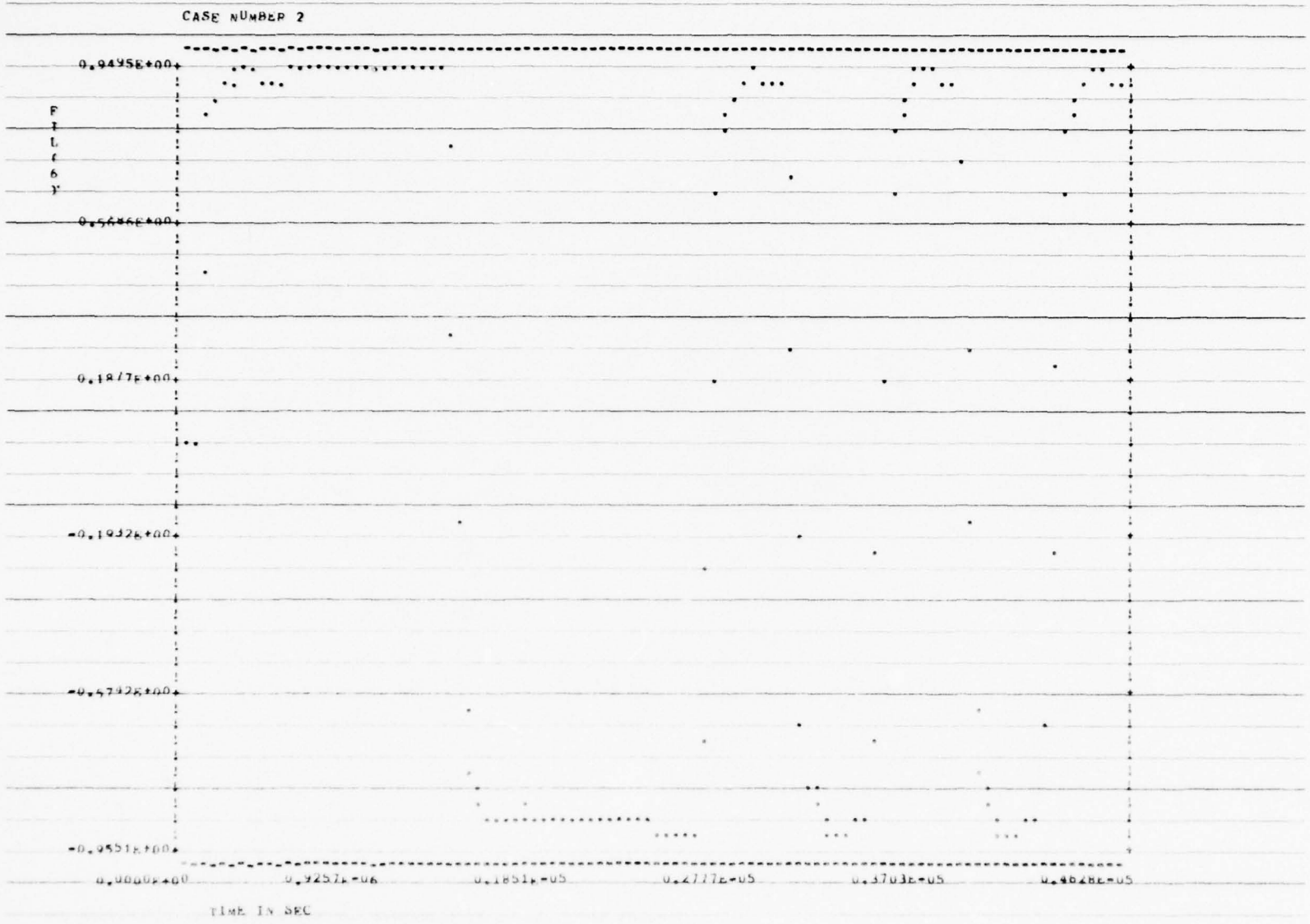

CASE NUMBER 2
F(2)
0.1041E+01
0.6004E+00
0.1998E+00
-0.2008E+00
-0.6013E+00
-0.1042E+01
0.0000E+00
0.4257E-06
0.1851E-05
0.2717E-05
0.3703E-05
0.4628E-05
TIME IN SEC


CASE NUMBER 2
0.9880E+00
F
I
L
(
3
)
0.5927E+00
0.1967E+00
-0.1970E+00
-0.5946E+00
-0.9903E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

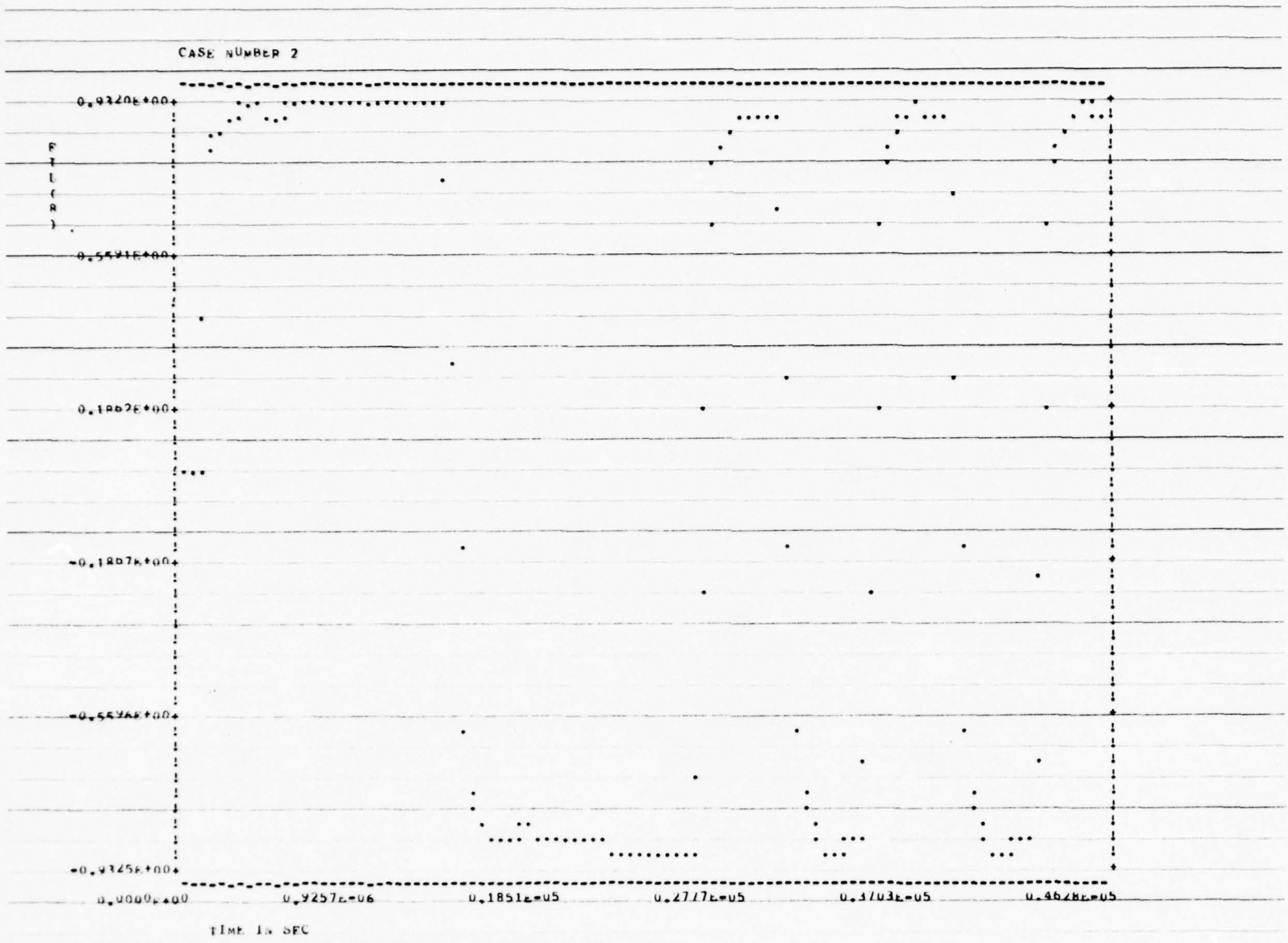

CASE NUMBER 2
STUB(3)
0.9646E+00
0.5787E+00
0.1927E+00
-0.1932E+00
-0.5791E+00
-0.9651E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC


CASE NUMBER 2
0.9748E+00
F
I
L
(
4
)
0.5042E+00
0.1936E+00
-0.1970E+00
-0.5876E+00
-0.9782E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

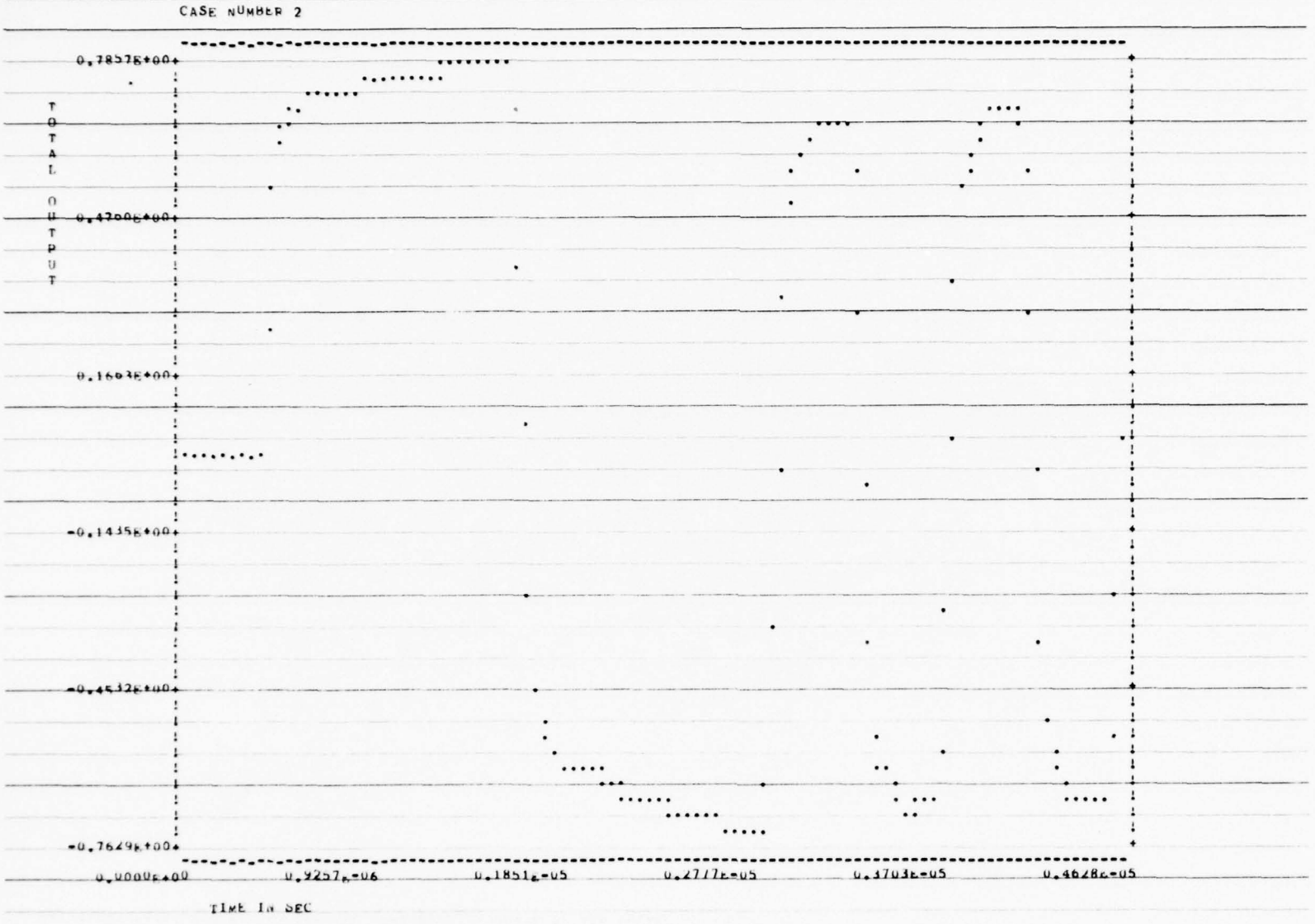
THE MINIMUM-MAXIMUM VALUES FOR THE VARIABLES IN CURVE 6 ARE EQUAL


CASE NUMBER 2
0.9495E+00
0.5686E+00
0.1877E+00
-0.1932E+00
-0.5742E+00
-0.9551E+00
F
I
L
E
6
Y
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

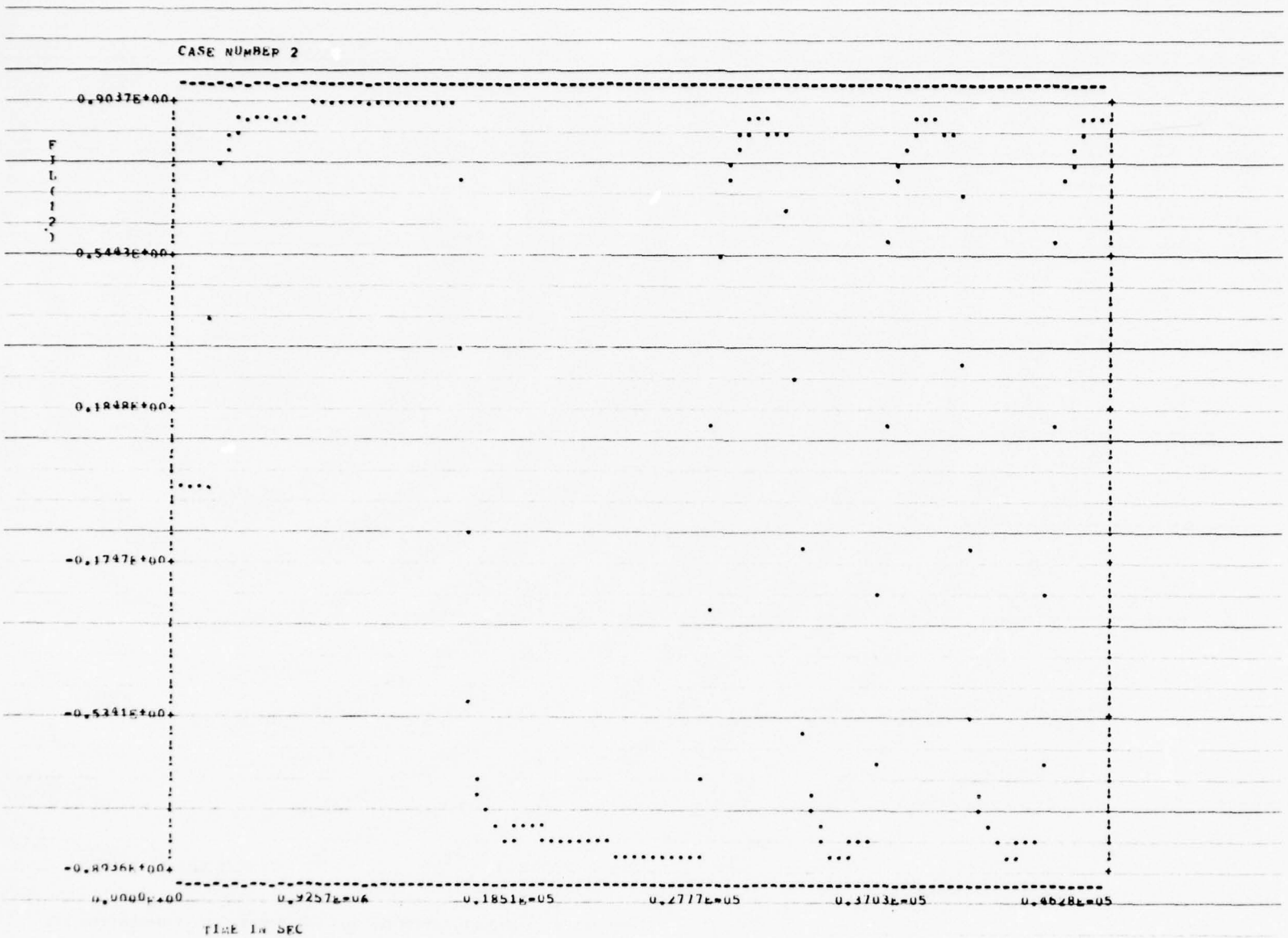
THE MINIMUM=MAXIMUM VALUES FOR THE VARIABLES IN CURVE TO ARE EQUAL

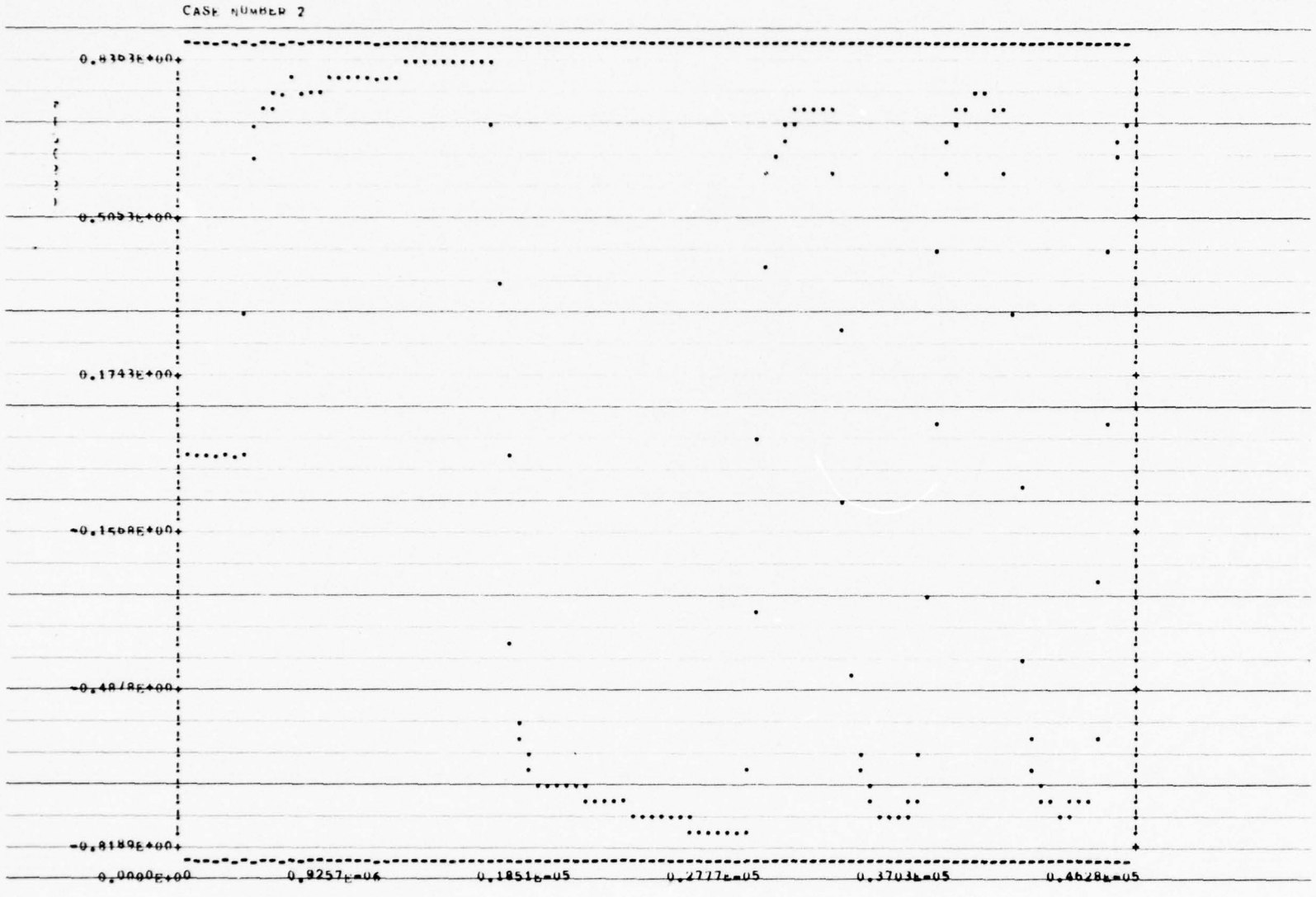

CASE NUMBER 2
F
T
L
(
R
)
0.9320E+00
0.5591E+00
0.1862E+00
-0.1867E+00
-0.5591E+00
-0.9320E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

THE MINIMUM-MAXIMUM VALUES FOR THE VARIABLES IN CURVE 12 ARE EQUAL

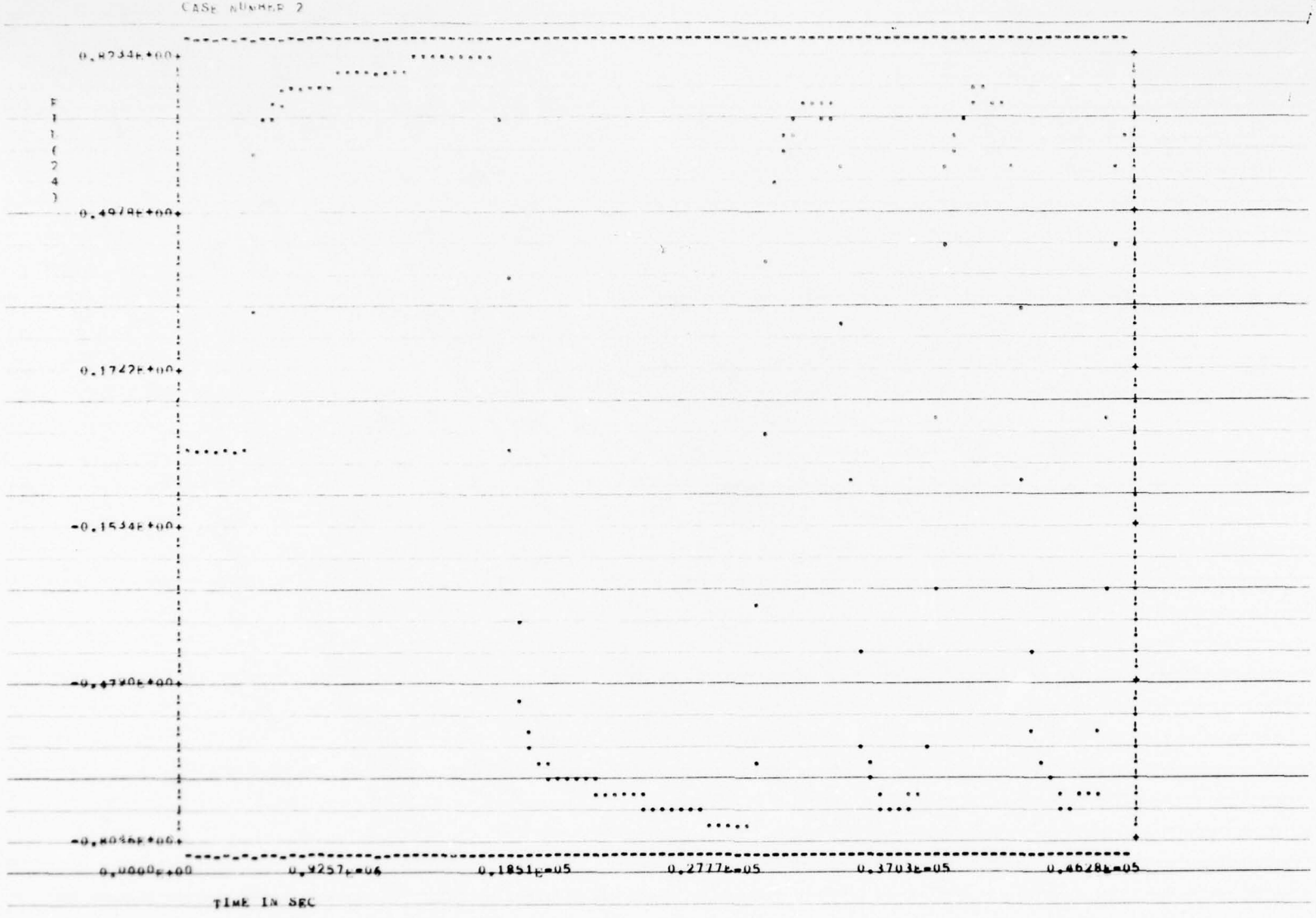

CASE NUMBER 2
0.7857E+00
0.4700E+00
0.1603E+00
-0.1435E+00
-0.4532E+00
-0.7629E+00
TOTAL OUTPUT
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

THE MINIMUM=MAXIMUM VALUES FOR THE VARIABLES IN CURVE 14 ARE EQUAL

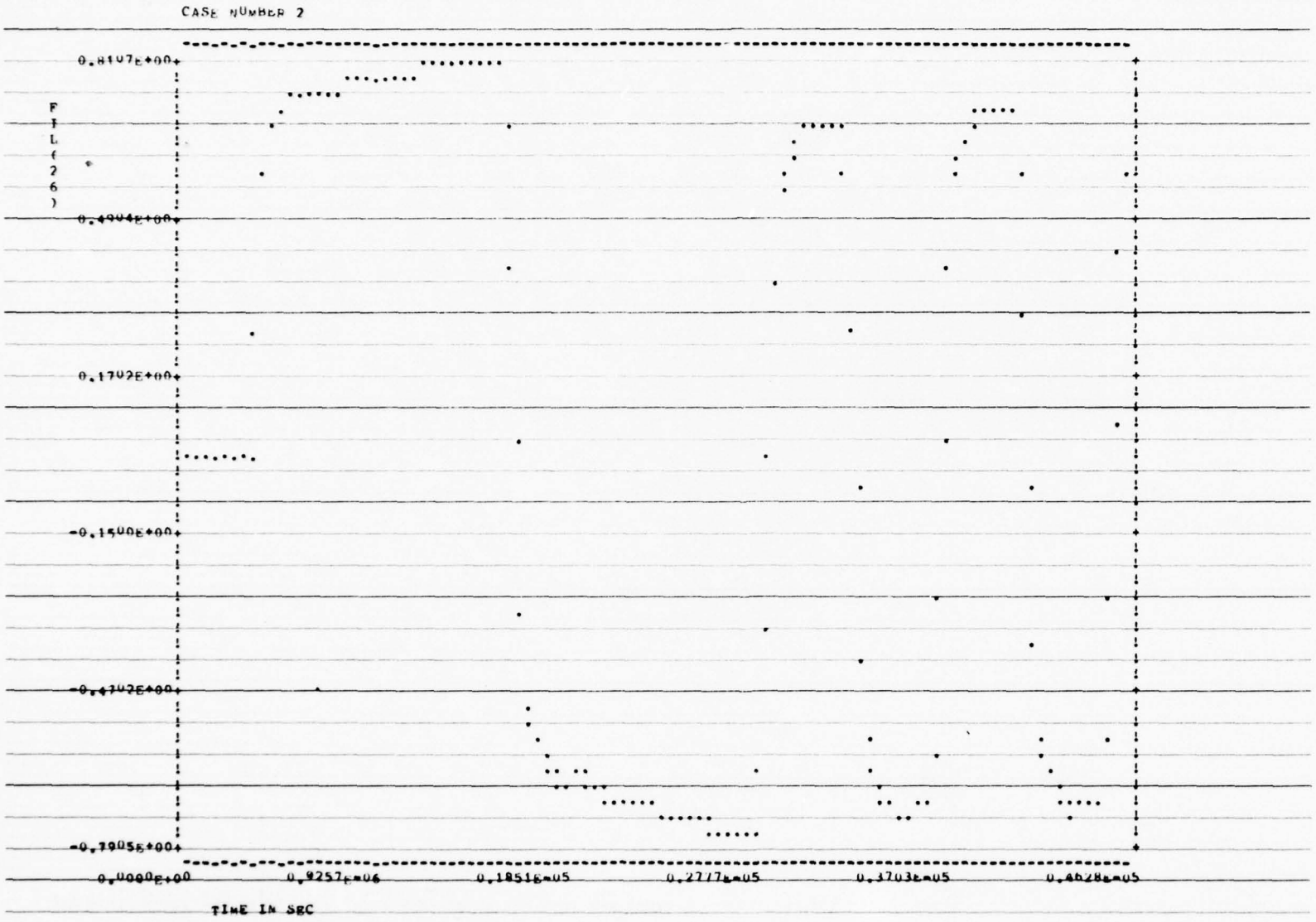

CASE NUMBER 2
0.9037E+00
F
I
L
(
1
2
)
0.5443E+00
0.1848E+00
-0.1747E+00
-0.5341E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC


CASE NUMBER 2
0.8303E+00
0.5093E+00
0.1743E+00
-0.1588E+00
-0.4818E+00
-0.8189E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

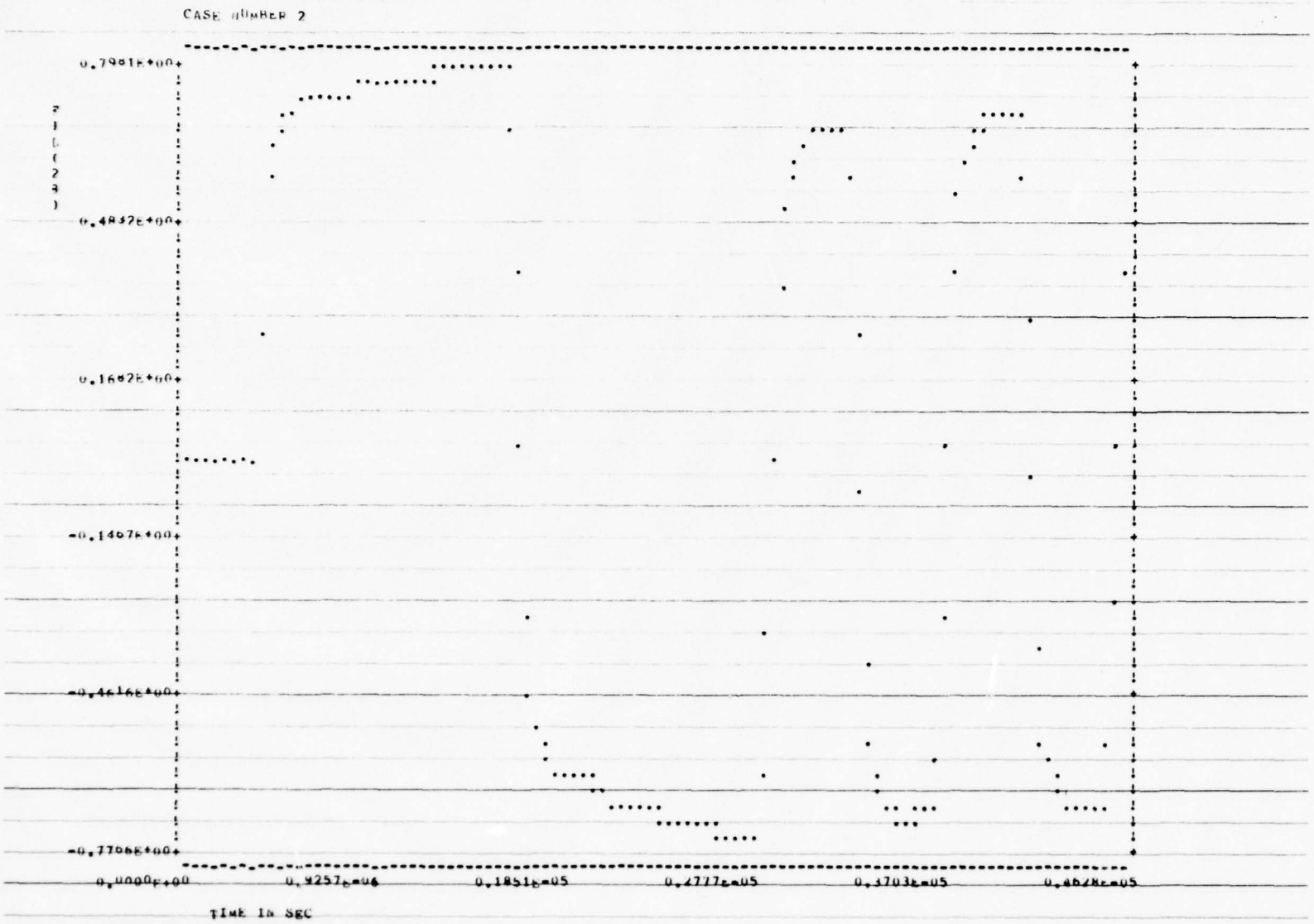
THE MINIMUM=MAXIMUM VALUES FOR THE VARIABLES IN CURVE 17 ARE EQUAL


CASE NUMBER 2
0.8234E+00
0.4978E+00
0.1742E+00
-0.1534E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

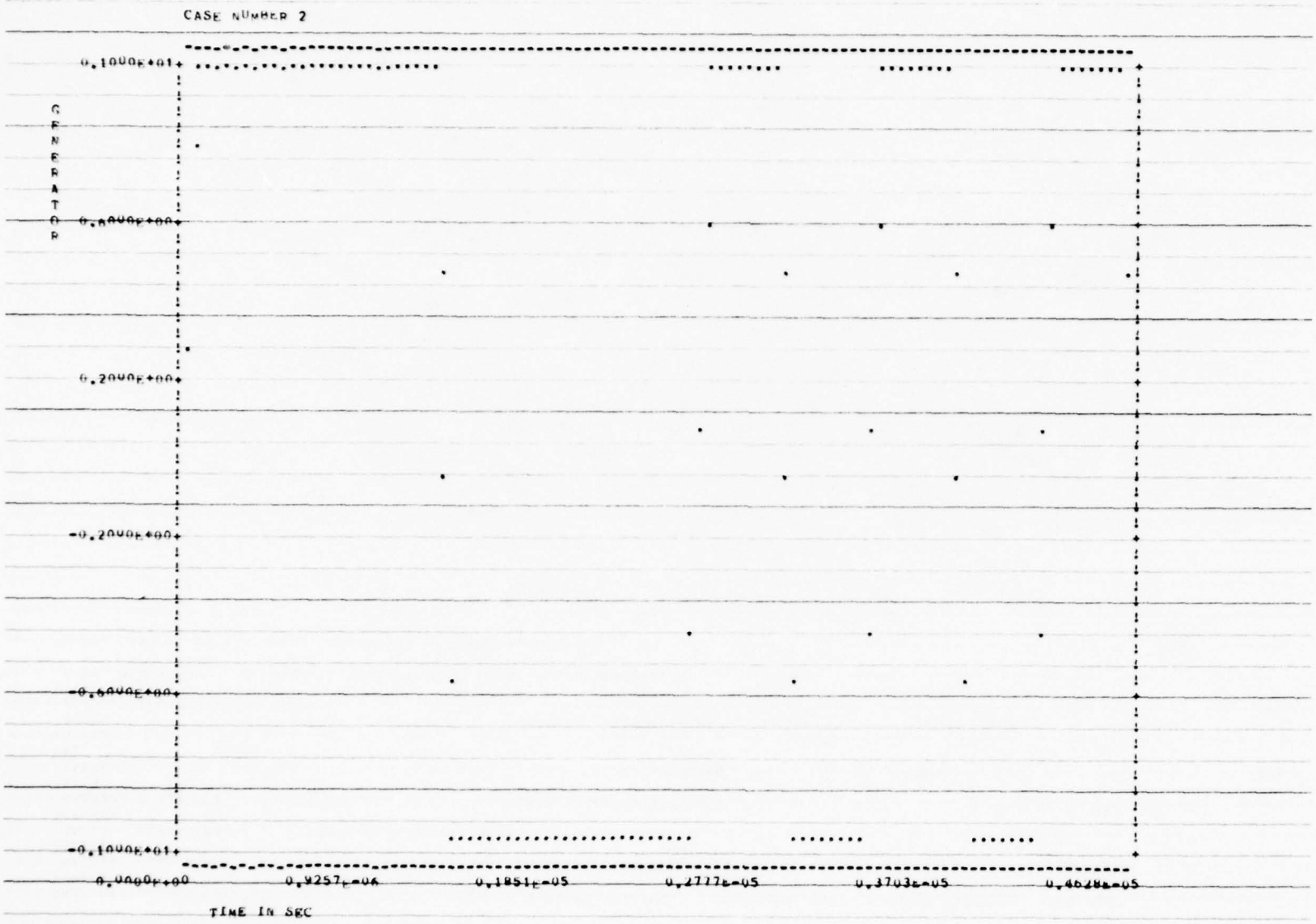
THE MINIMUM-MAXIMUM VALUES FOR THE VARIABLES IN CURVE 19 ARE EQUAL


CASE NUMBER 2
0.8107E+00
F
L
(
2
6
)
0.4904E+00
0.1702E+00
-0.1500E+00
-0.4702E+00
-0.7905E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

THE MINIMUM-MAXIMUM VALUES FOR THE VARIABLES IN CURVE 21 ARE EQUAL


CASE NUMBER 2
0.7981E+00
0.4832E+00
0.1682E+00
-0.1467E+00
-0.4616E+00
-0.7766E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

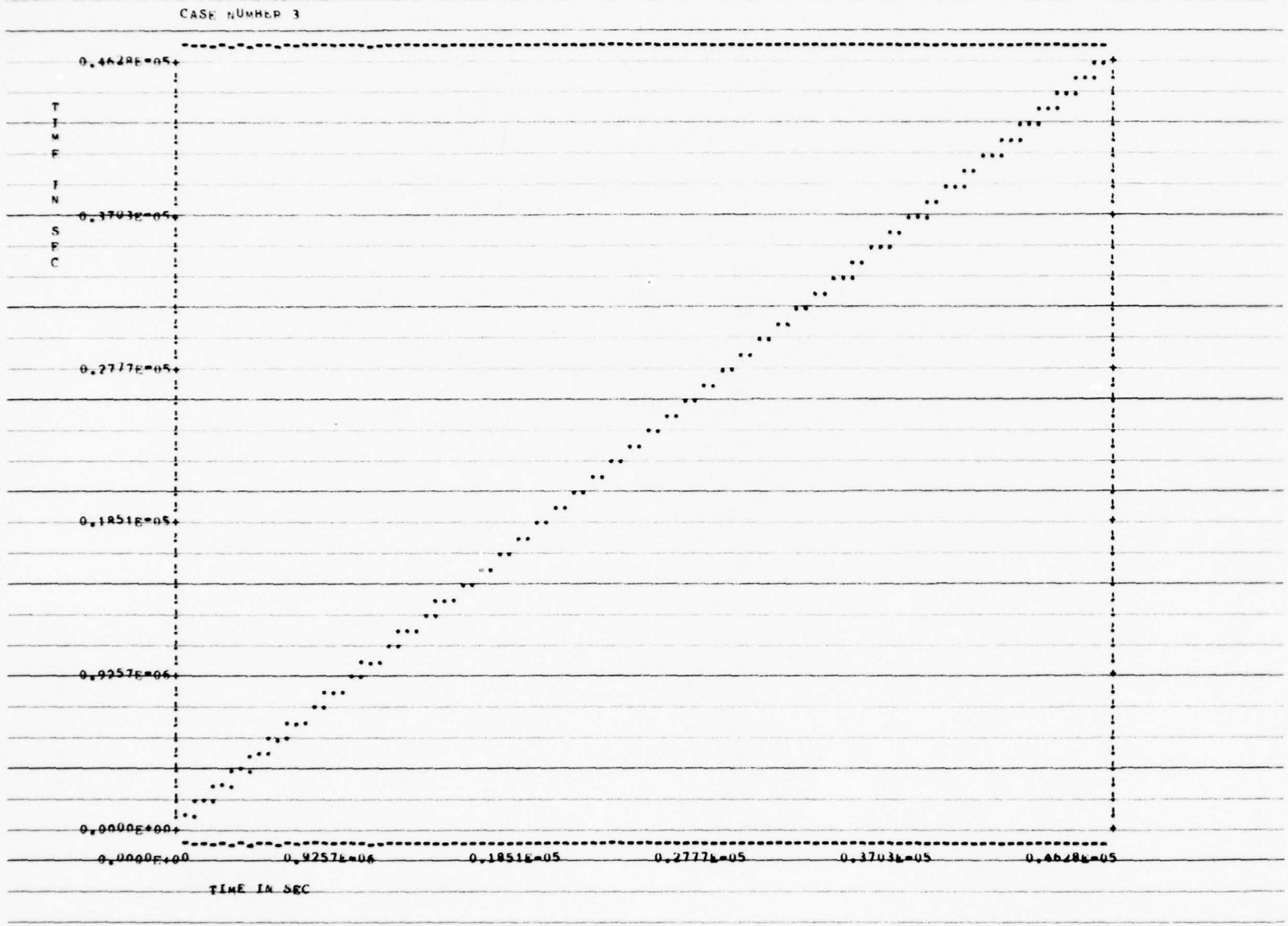
THE MINIMUM-MAXIMUM VALUES FOR THE VARIABLES IN CURVE 23 ARE EQUAL

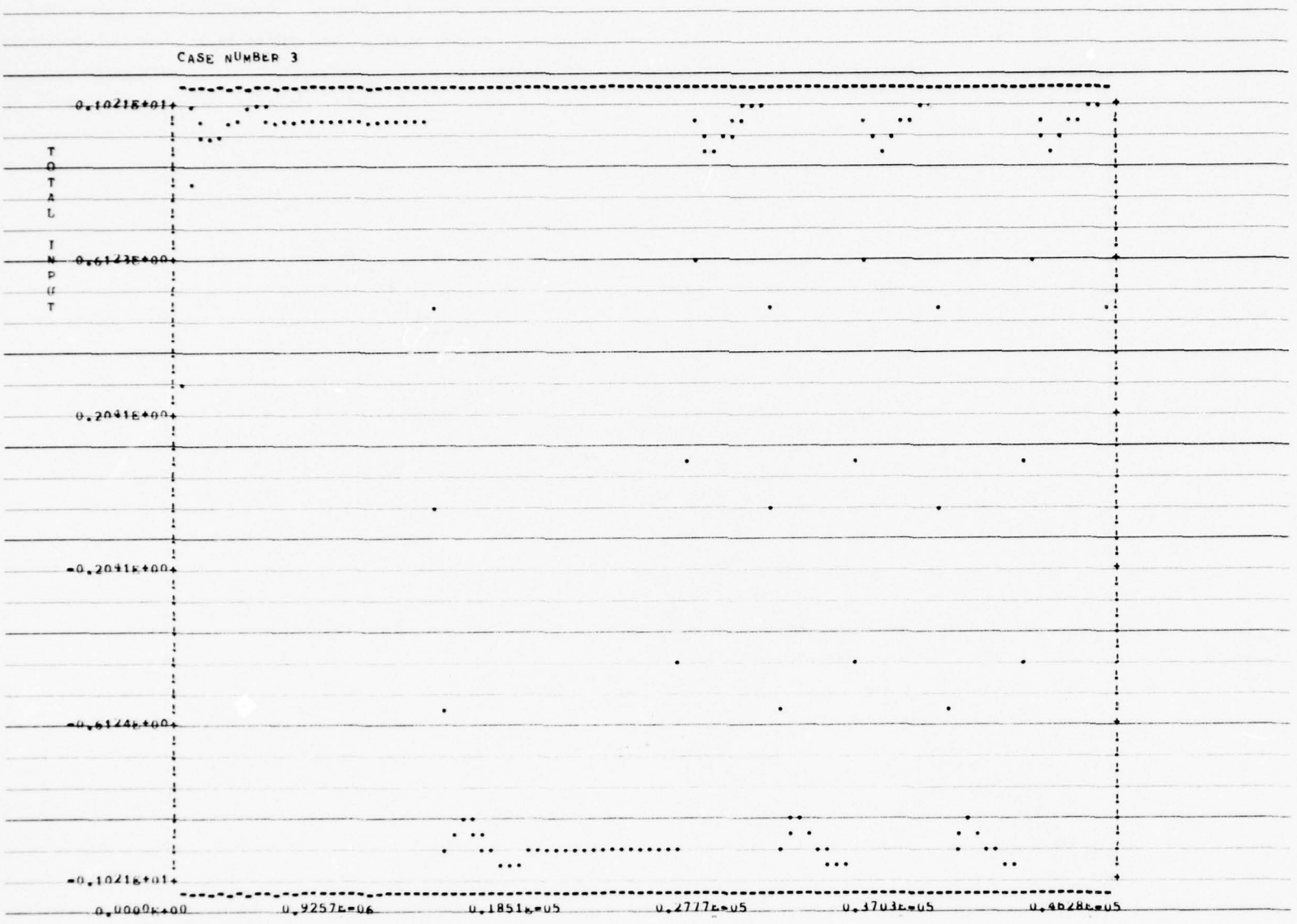

CASE NUMBER 2
0.1000E+01
0.2000E+00
-0.2000E+00
-0.1000E+01
GENERATOR
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

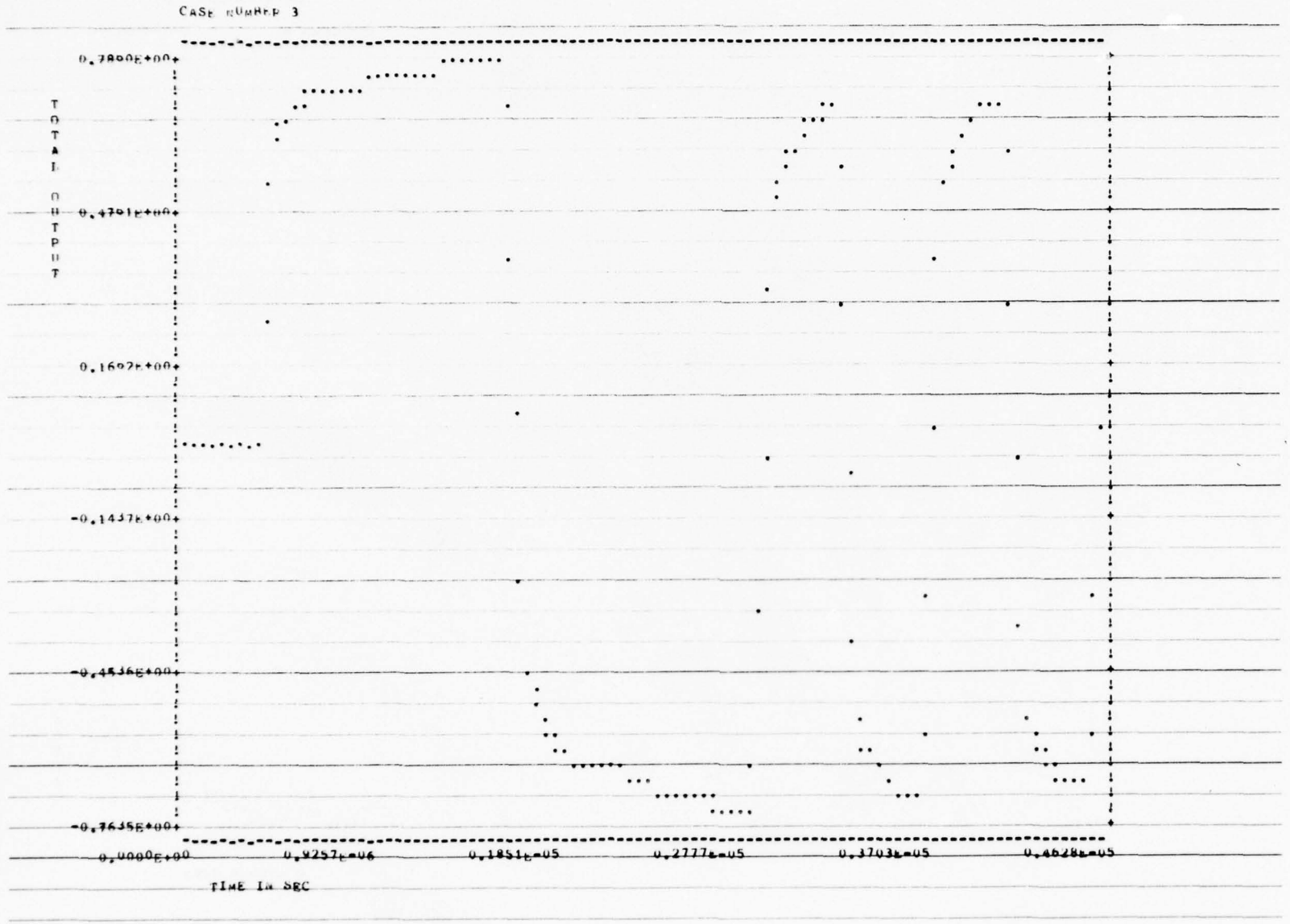
```
NEW JOB BEGINNING

$ECT DATA .0000000;330  350.0  112.0  10.0  0.89200  0.93570  0.00850  0.00000  0.00000 68.00000  2200.000
$TRAN1
 GAIN1= 0.2676700    , ANSG1= 0.4953000E+15, TAUZ=1=  8000000.    , $
$TRAN2
 GAIN2= 0.2472180    , RDUT2= 0.2000000E+08, $
$GENXFR
 GAIN3= 0.3800000    , POLE=  8000000.    , REF1= =0.66000000E=01, $
$STUB
 ISTUB=2*              0,              1, 28*              0, NPSKIP=              2, LSTUB=2*              0,              20,
28,              0, $
$GENER
 IGEN=              0, GENMAX=  1.000000    , TSLOPE= 0.5000000E=07, NCC1N=             94, NCCF=             32,
 ZC=  68.00000    , $
$SKIN
 GI1=  0.9730000    , GI2= 0.7900000E=02, GI3= 0.6085800E=02, $

PLOTER CALLED. 24 VARIABLES SPECIFIED. 24 PLOTS REQUESTED.
```

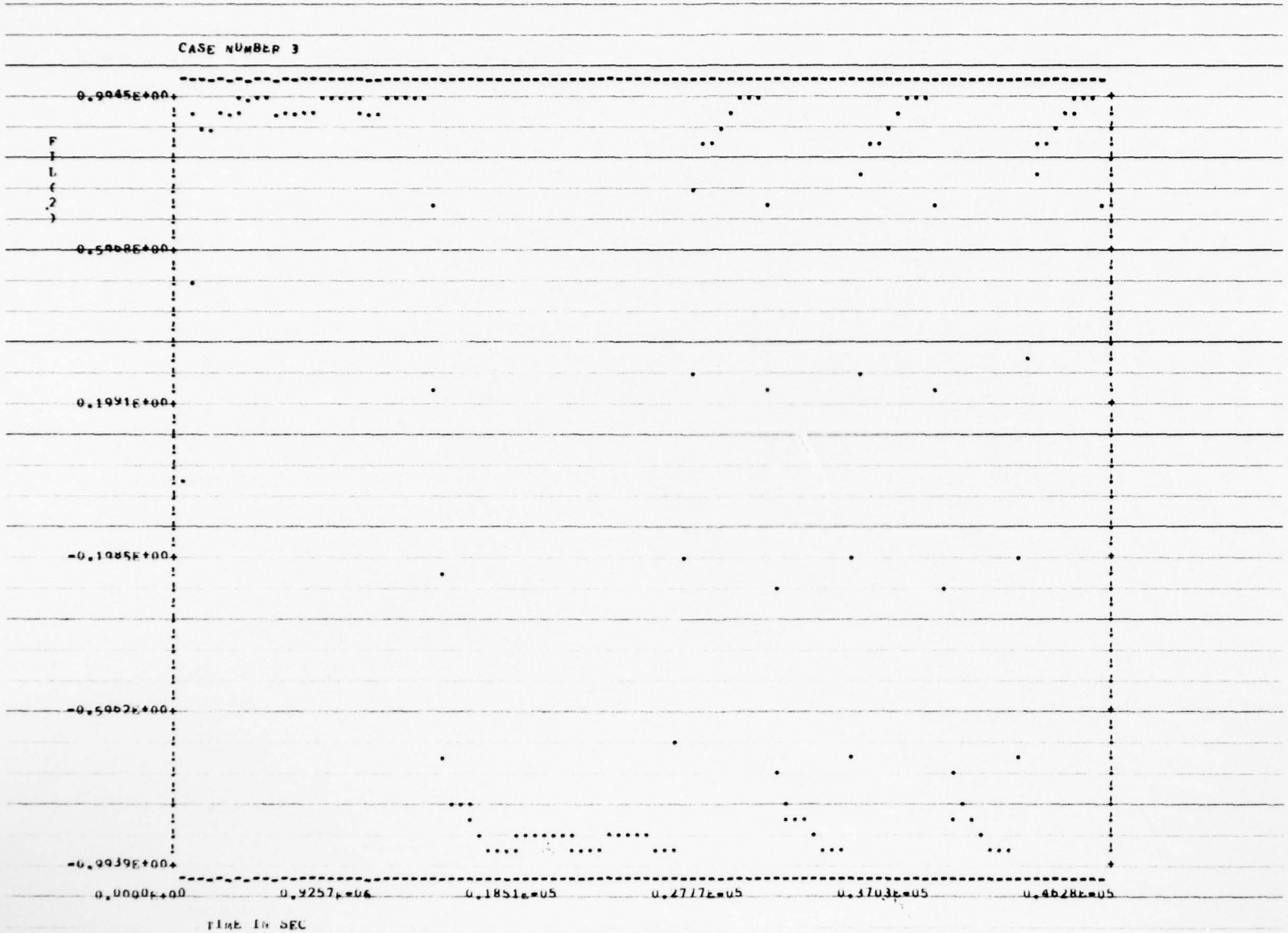
DATA BUS SIMULATION OF A 68 OHM TWISTED SHIELDED PAIR

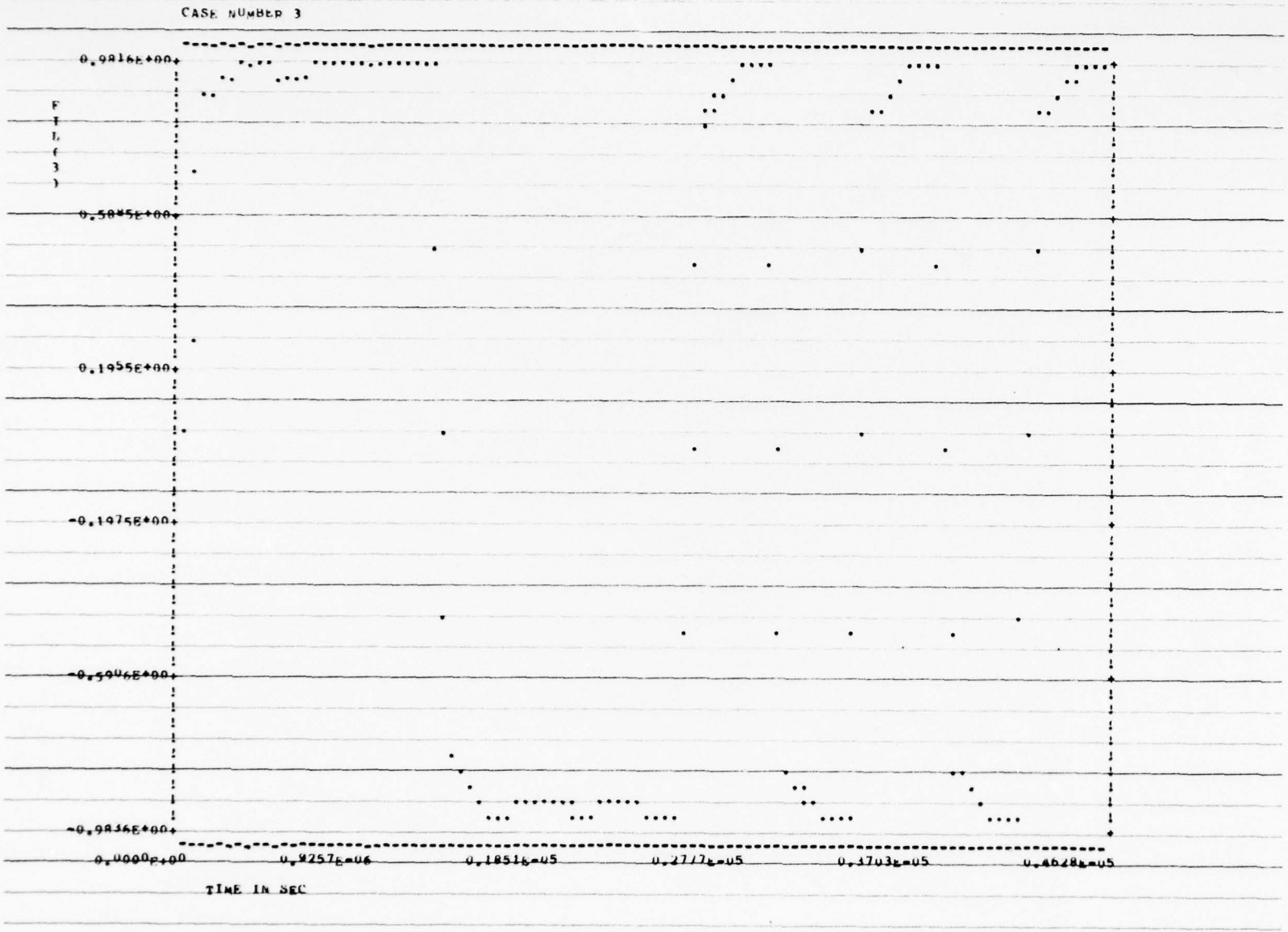
THE MINIMUM-MAXIMUM VALUES FOR THE VARIABLES IN CURVE 23 ARE EQUAL

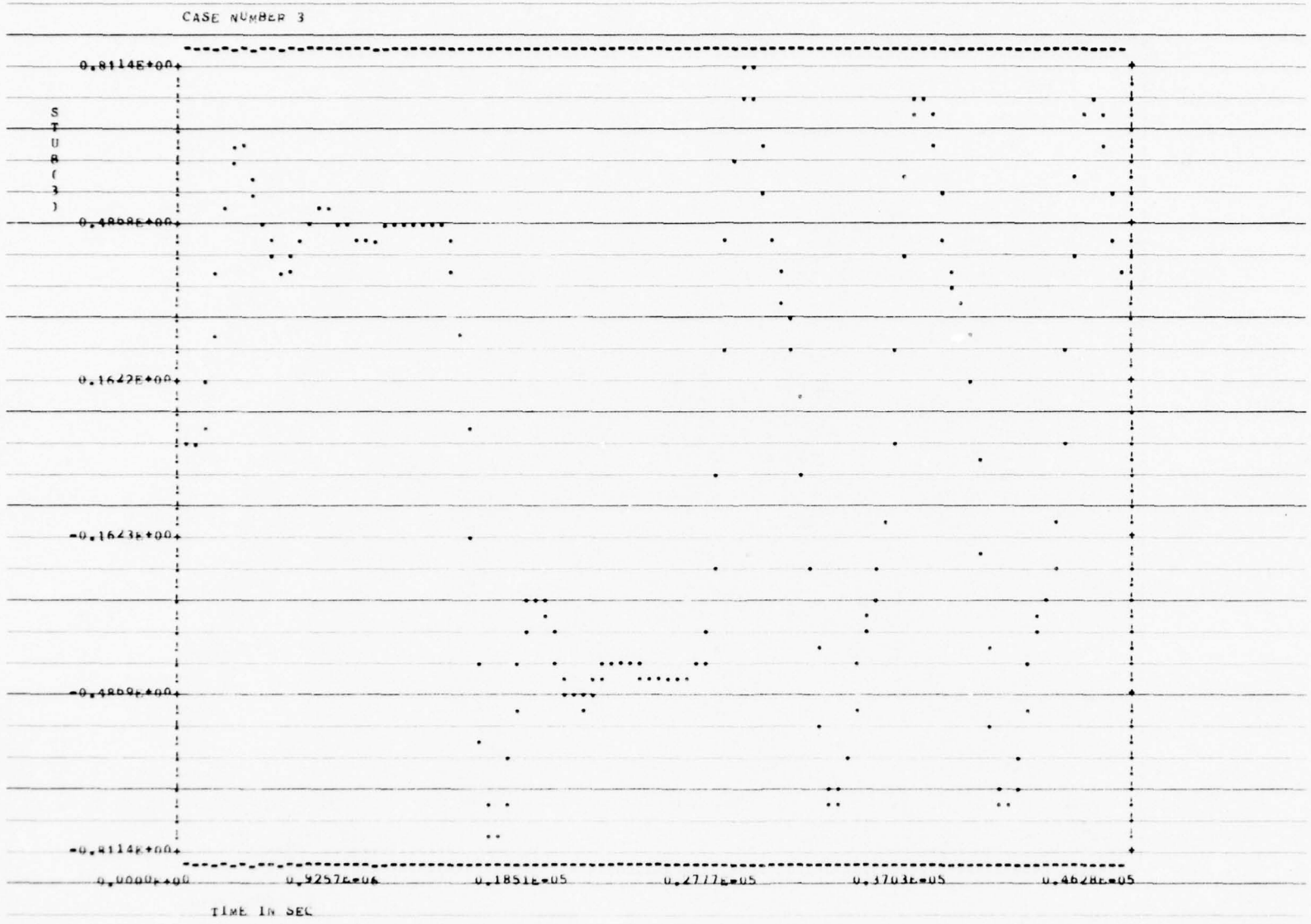

CASE NUMBER 3
TIME IN SEC
0.4628E+05
0.3703E+05
0.2777E+05
0.1851E+05
0.9257E+06
0.0000E+00
0.0000E+00
0.9257E+04
0.1851E+05
0.2777E+05
0.3703E+05
0.4628E+05
TIME IN SEC

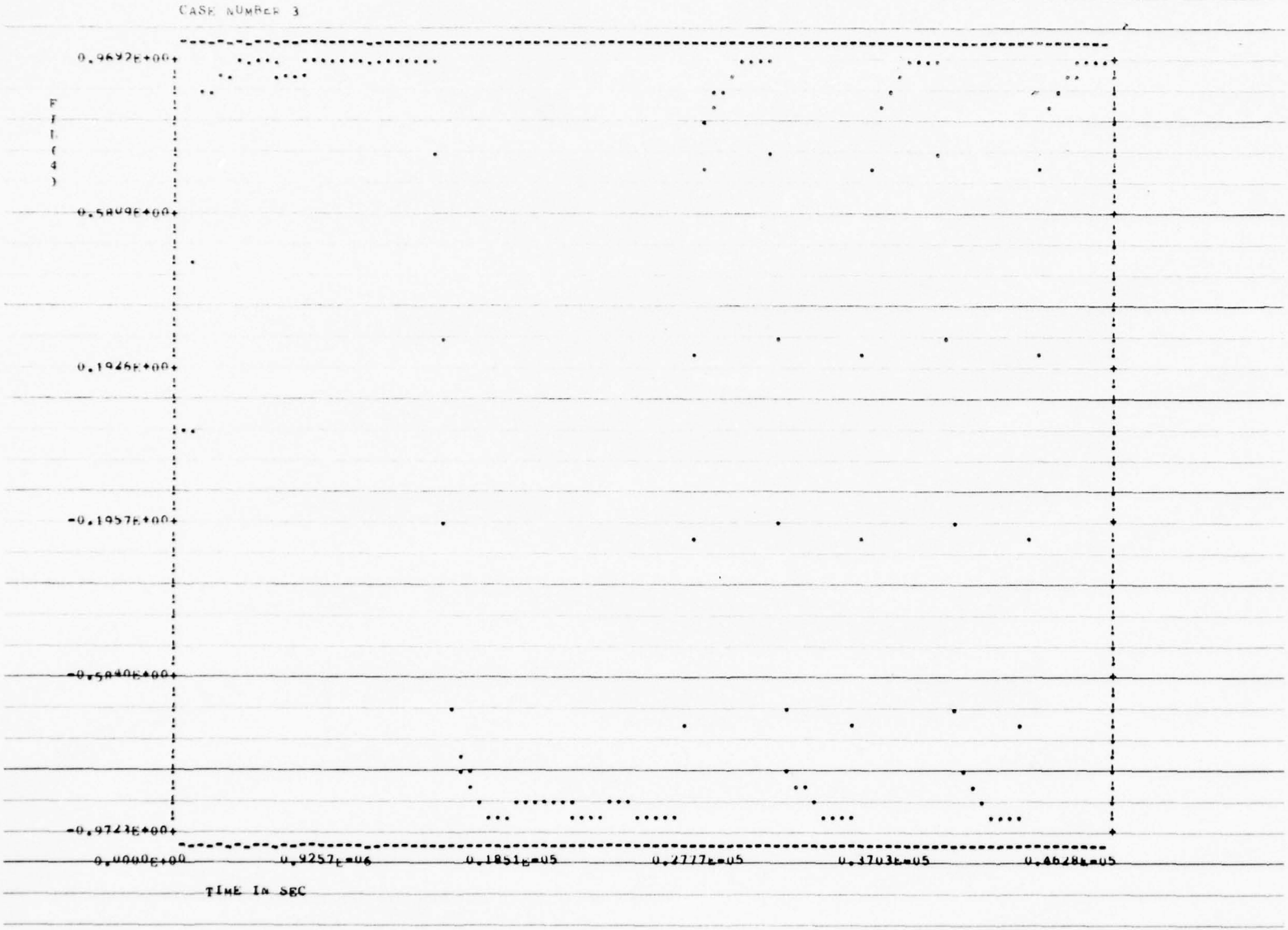

CASE NUMBER 3
0.1021E+01
TOTAL INPUT
0.6123E+00
0.2041E+00
-0.2041E+00
-0.6124E+00
-0.1021E+01
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC


CASE NUMBER 3
0.7890E+00
0.4791E+00
0.1692E+00
-0.1437E+00
-0.4536E+00
-0.7635E+00
TOTAL OUTPUT
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

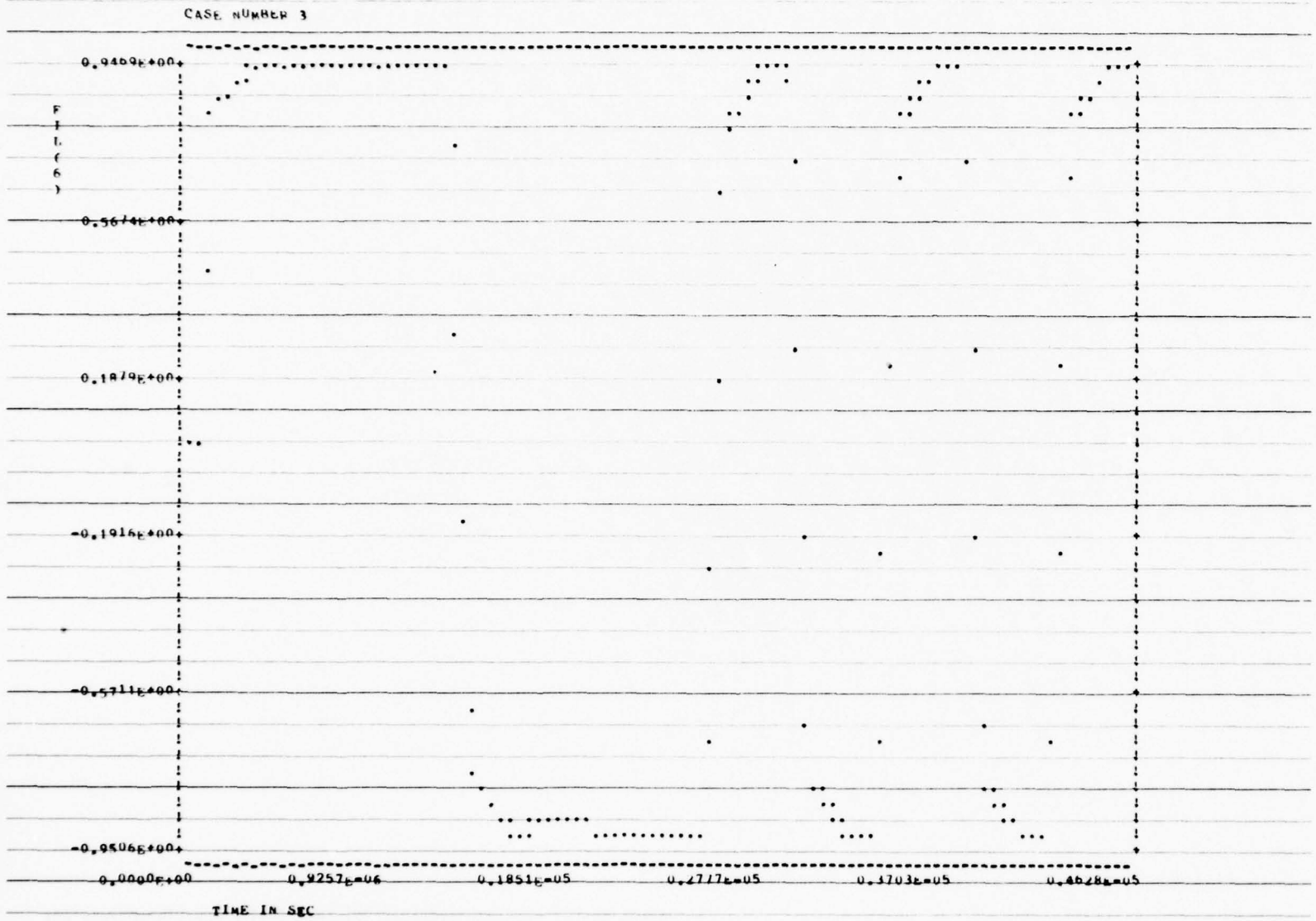

CASE NUMBER 3
0.9945E+00
0.5008E+00
0.1991E+00
-0.1985E+00
-0.5962E+00
-0.9939E+00
F
I
L
(
2
)
0.0000E+00
0.9257E+05
0.1851E+05
0.2777E+05
0.3703E+05
0.4628E+05
TIME IN SEC


CASE NUMBER 3
0.9816E+00
0.5845E+00
0.1955E+00
-0.1975E+00
-0.5906E+00
-0.9836E+00
F
T
L
G
3
)
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

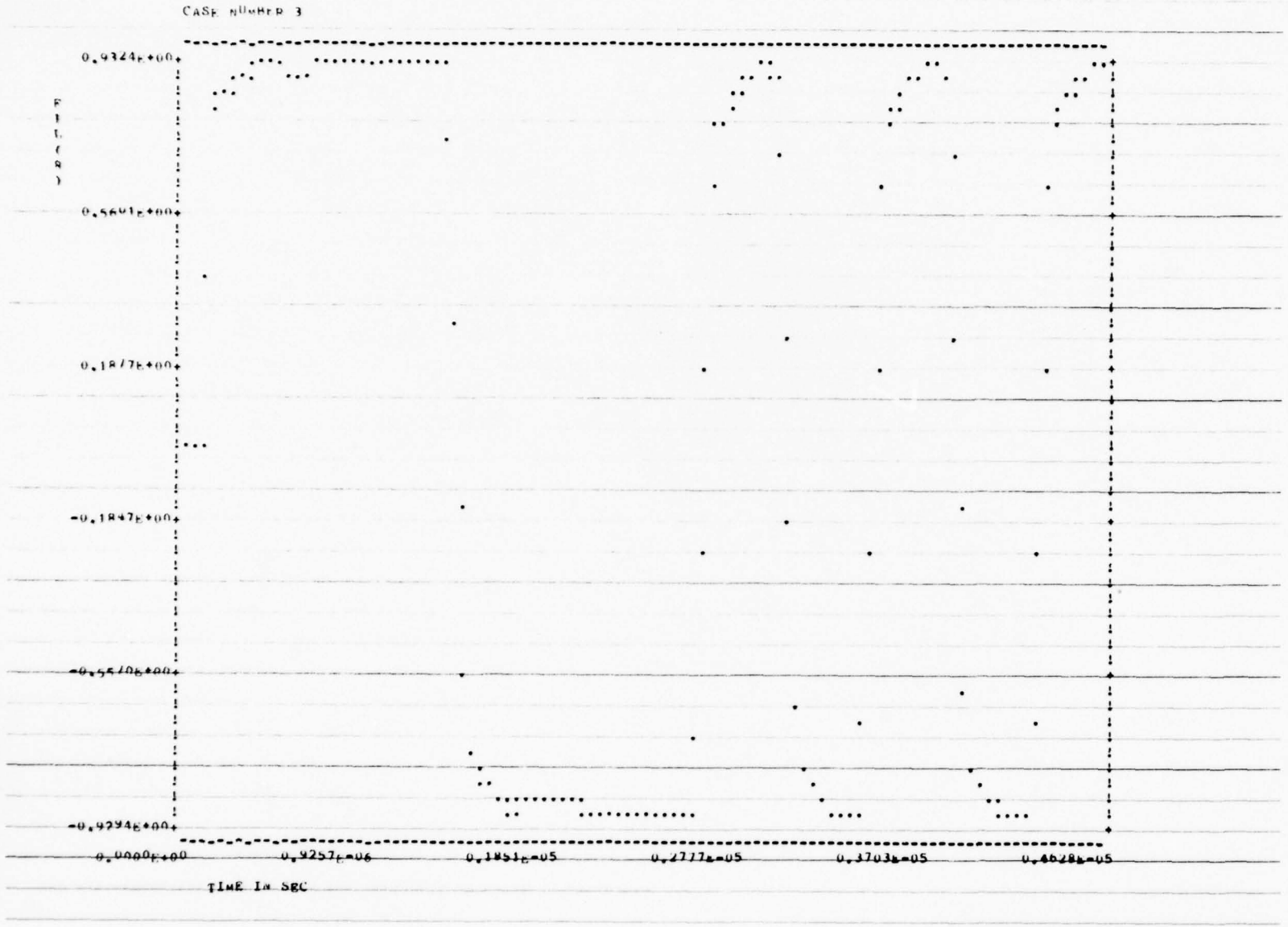

CASE NUMBER 3
0.8114E+00
0.4868E+00
0.1622E+00
-0.1623E+00
-0.4869E+00
-0.8114E+00
STUB(3)
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC


CASE NUMBER 3
0.9892E+00
0.5809E+00
0.1946E+00
-0.1957E+00
-0.5840E+00
-0.9723E+00
F(4)
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

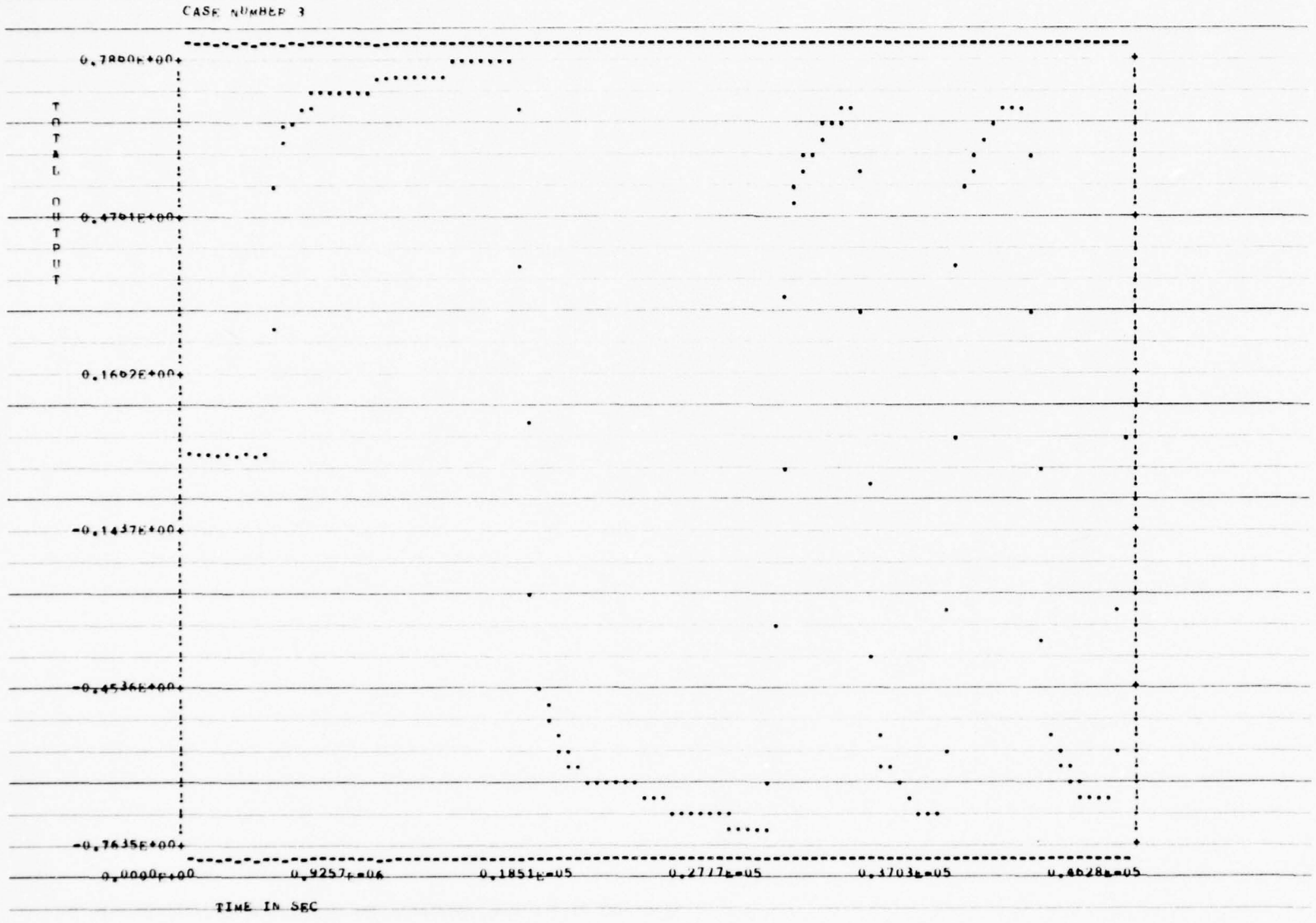
THE MINIMUM-MAXIMUM VALUES FOR THE VARIABLES IN CURVE 8 ARE EQUAL


CASE NUMBER 3
0.9469E+00
0.5674E+00
0.1879E+00
-0.1916E+00
-0.5711E+00
-0.9506E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

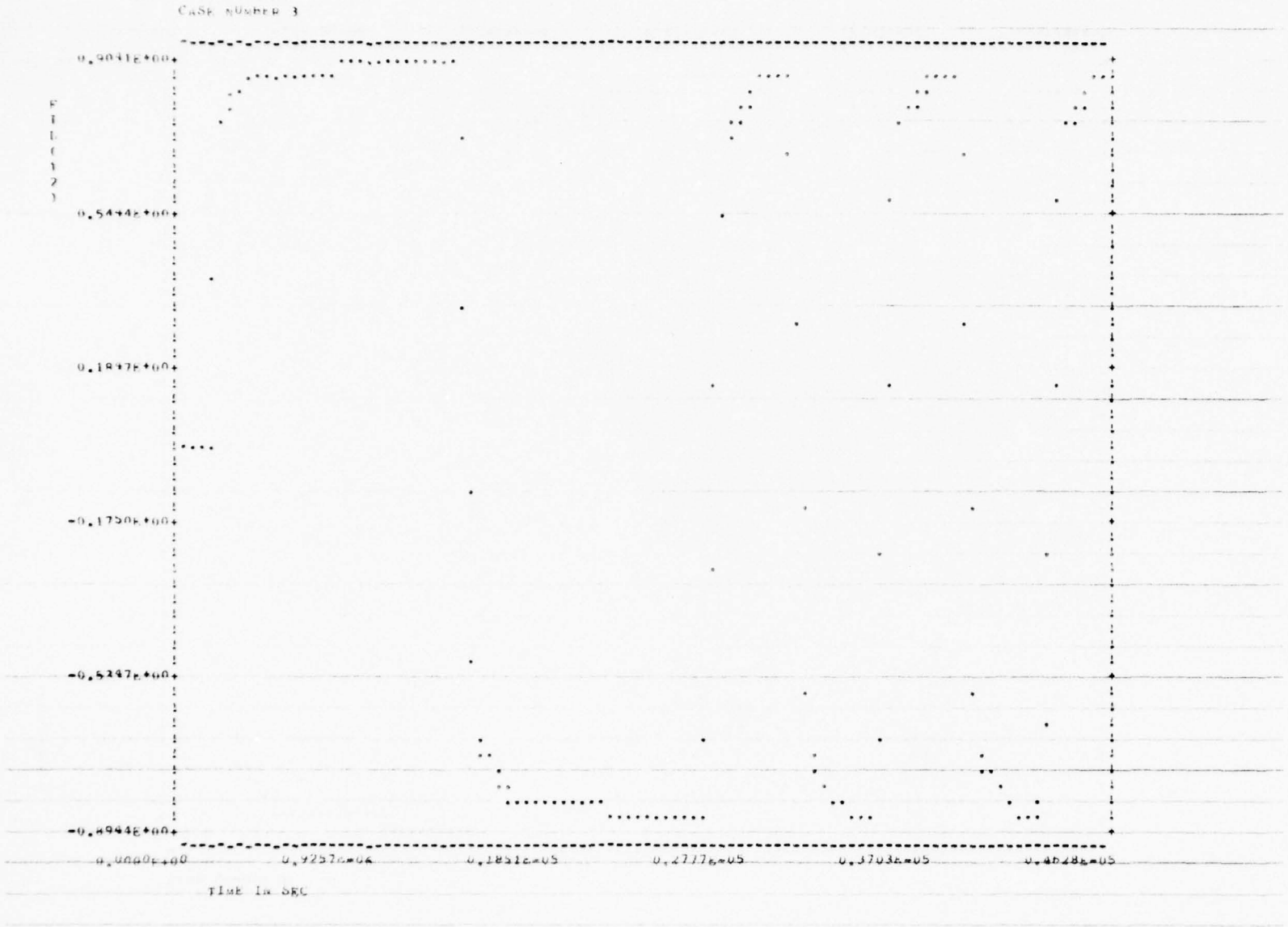
THE MINIMUM-MAXIMUM VALUES FOR THE VARIABLES IN CURVE 10 ARE EQUAL

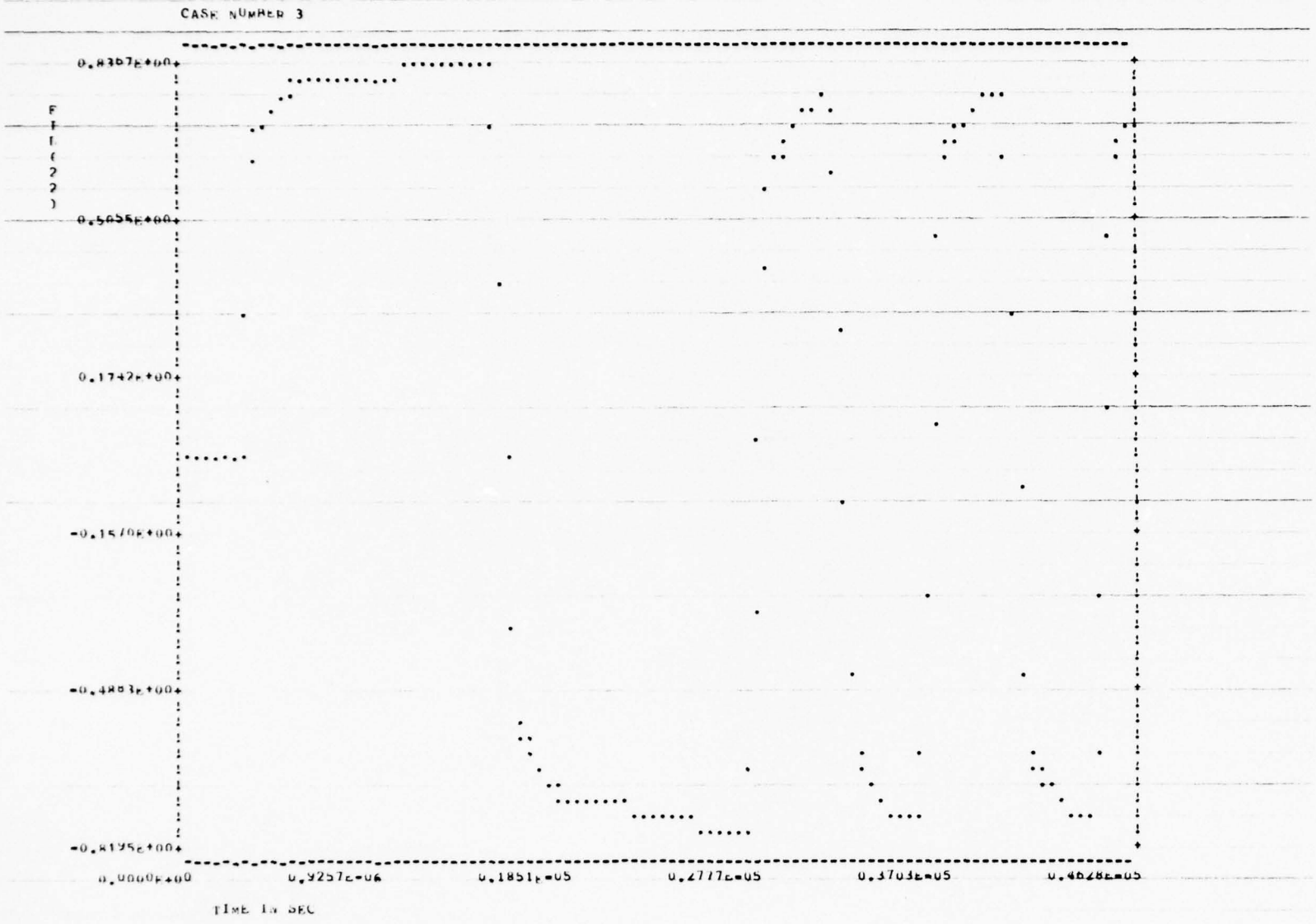

CASE NUMBER 3
0.9324E+00
0.5601E+00
0.1877E+00
-0.1847E+00
-0.5570E+00
-0.9294E+00
F(I,J)
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

THE MINIMUM-MAXIMUM VALUES FOR THE VARIABLES IN CURVE 12 ARE EQUAL

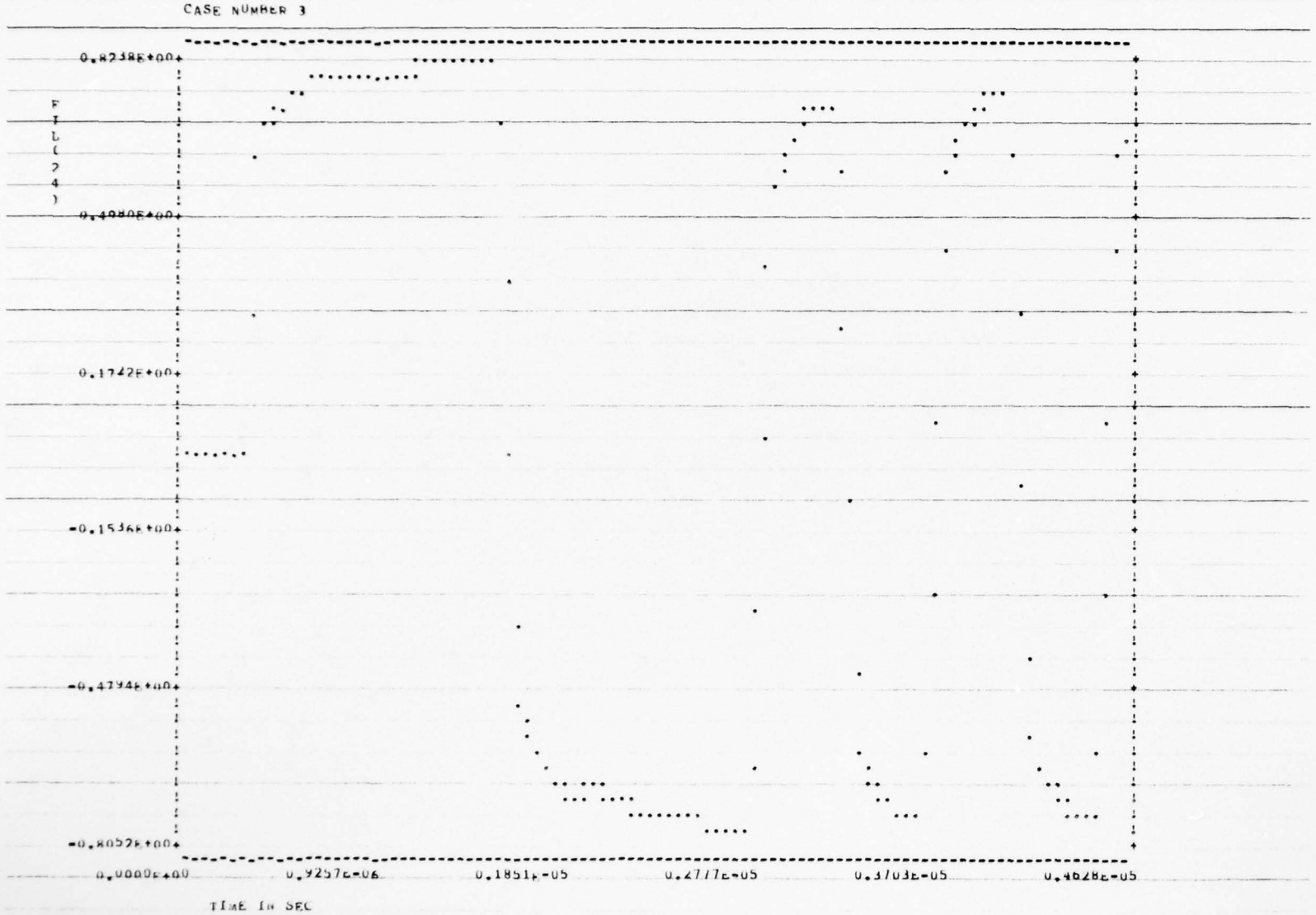

CASE NUMBER 3
0.7800E+00
0.4791E+00
0.1692E+00
-0.1437E+00
-0.4536E+00
-0.7635E+00
TOTAL OUTPUT
0.0000E+00
0.9257E+04
0.1851E+05
0.2777E+05
0.3703E+05
0.4628E+05
TIME IN SEC

THE MINIMUM-MAXIMUM VALUES FOR THE VARIABLES IN CURVE 14 ARE EQUAL

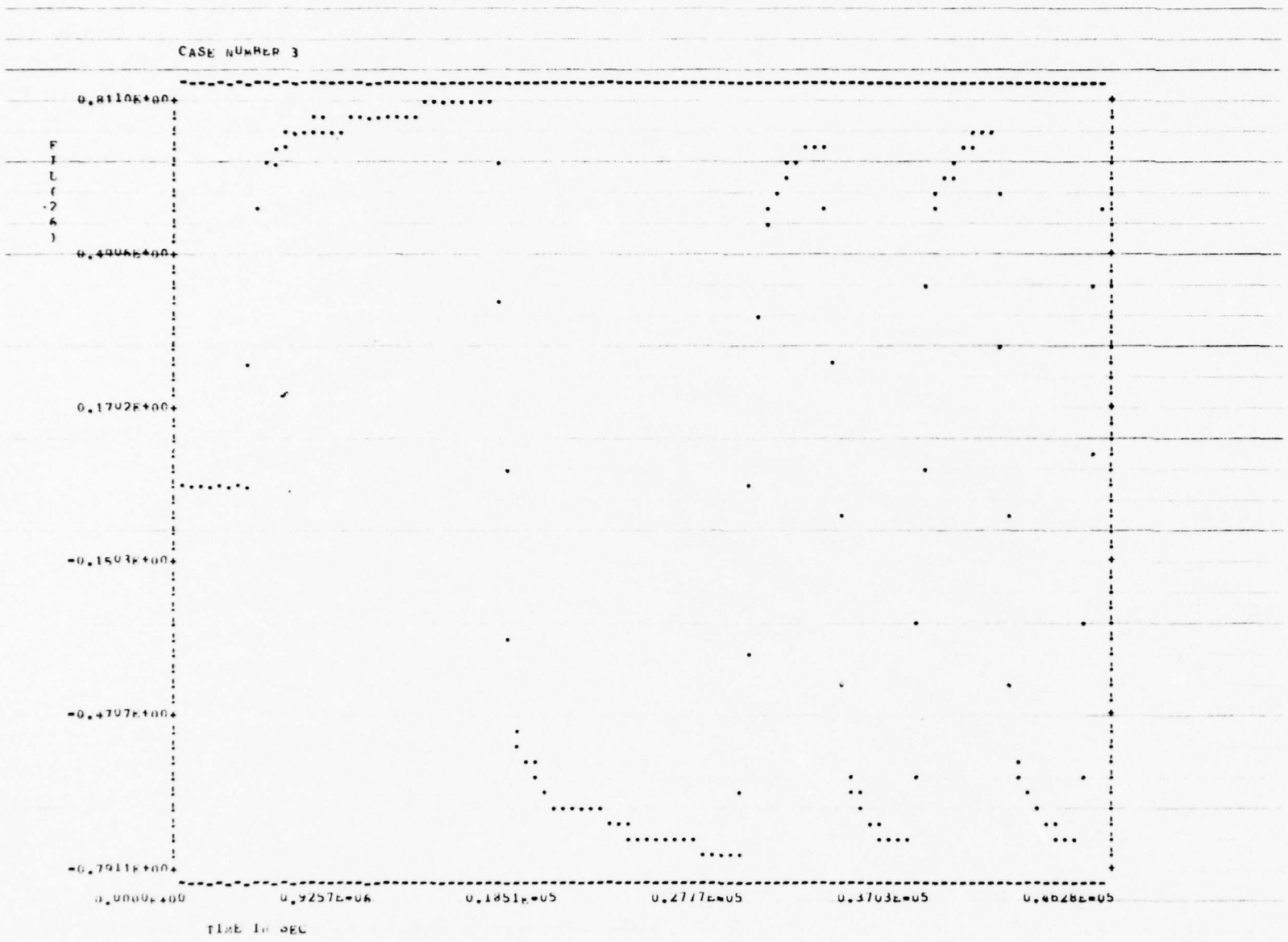

CASE NUMBER 3
0.9041E+00
0.5444E+00
0.1847E+00
-0.1750E+00
-0.5347E+00
-0.8944E+00
F
I
(
1
2
)
0.0000E+00
0.9257E+04
0.1851E+05
0.2777E+05
0.3703E+05
0.4628E+05
TIME IN SEC


CASE NUMBER 3
F
I
(
2
2
)
0.8367E+00
0.5655E+00
0.1742E+00
-0.1570E+00
-0.4883E+00
-0.8195E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

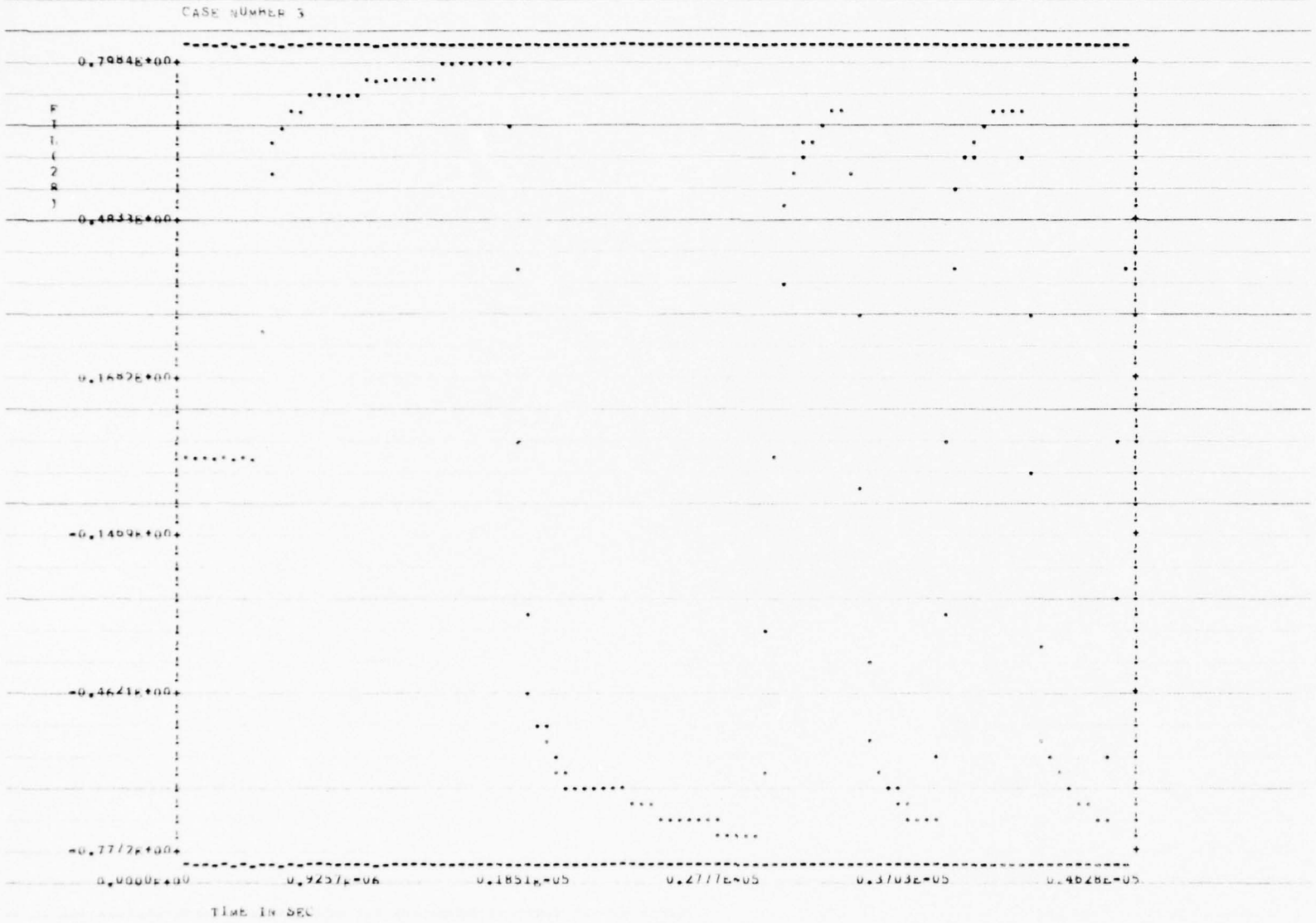
THE MINIMUM-MAXIMUM VALUES FOR THE VARIABLES IN CURVE 17 ARE EQUAL


CASE NUMBER 3
0.8238E+00
0.4080E+00
0.1742E+00
-0.1536E+00
-0.4794E+00
-0.8052E+00
F(T)
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

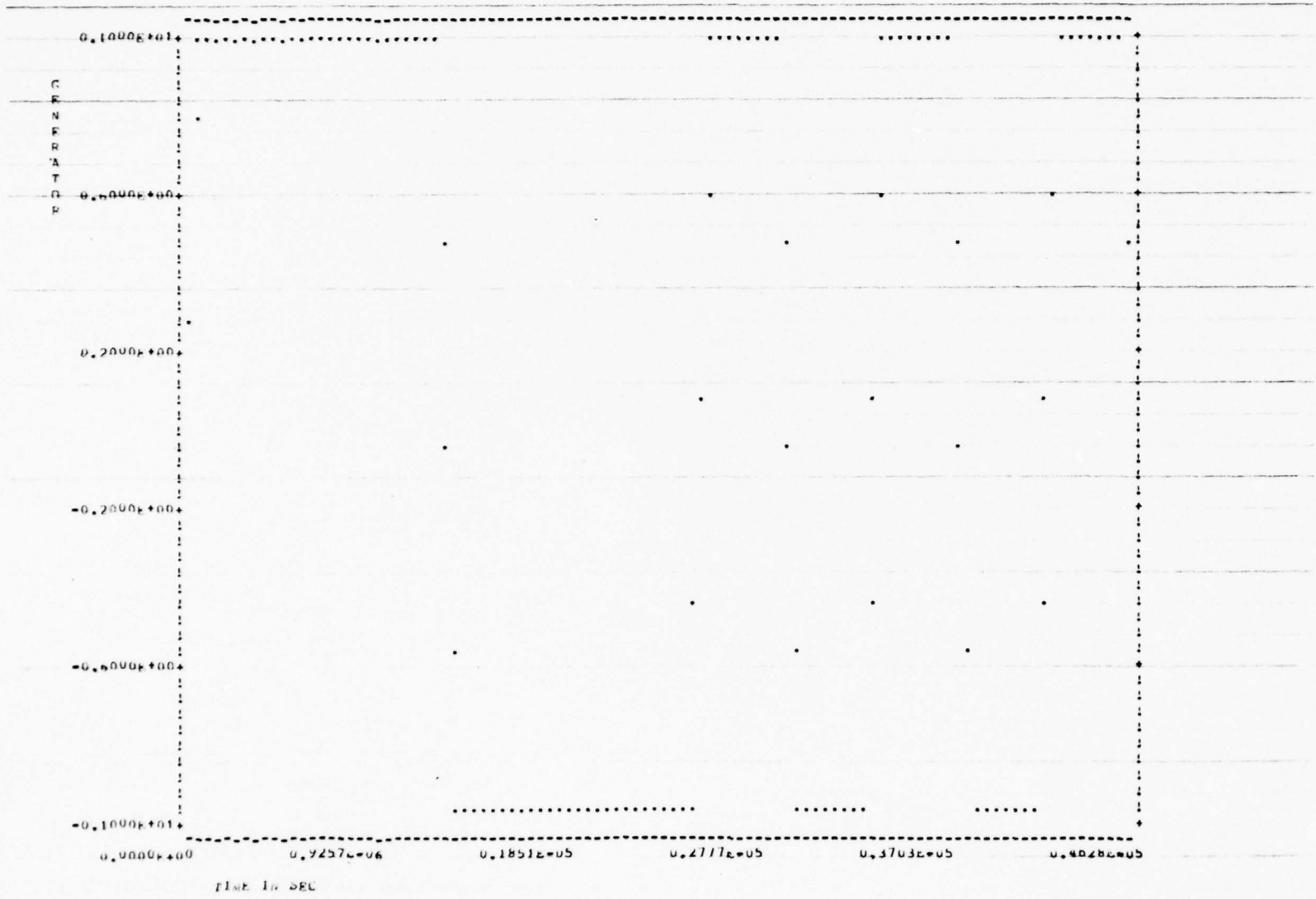
THE MINIMUM-MAXIMUM VALUES FOR THE VARIABLES IN CURVE 19 ARE EQUAL


CASE NUMBER 3
0.8110E+00
0.1702E+00
-0.1503E+00
-0.4707E+00
-0.7911E+00
0.0000E+00
0.9257E+04
0.1851E+05
0.2777E+05
0.3703E+05
TIME IN SEC

THE MINIMUM-MAXIMUM VALUES FOR THE VARIABLES IN CURVE 21 ARE EQUAL


CASE NUMBER 3
0.7984E+00
0.4833E+00
0.1682E+00
-0.1489E+00
-0.4641E+00
-0.7772E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

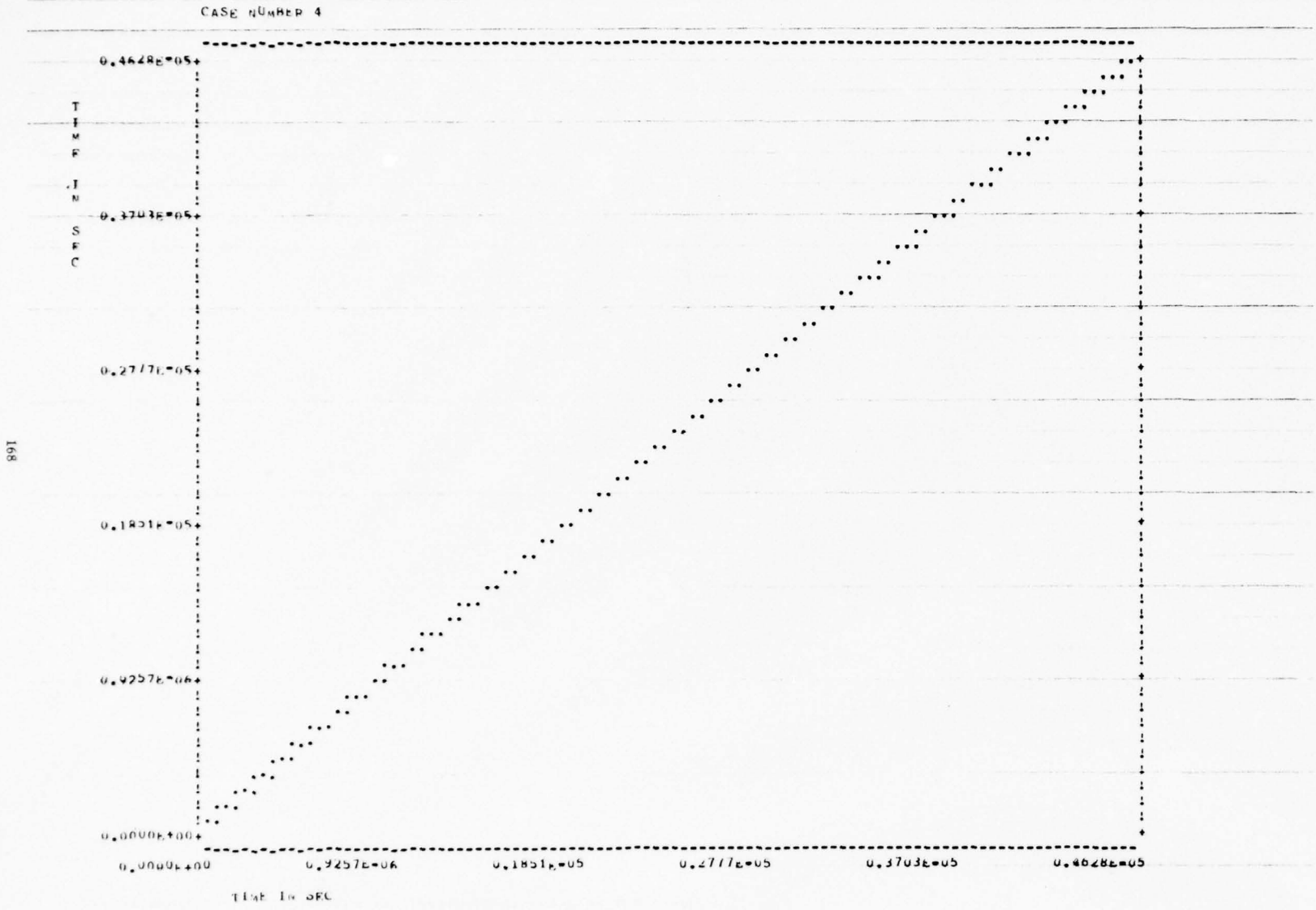
THE MINIMUM-MAXIMUM VALUES FOR THE VARIABLES IN CURVE 23 ARE EQUAL

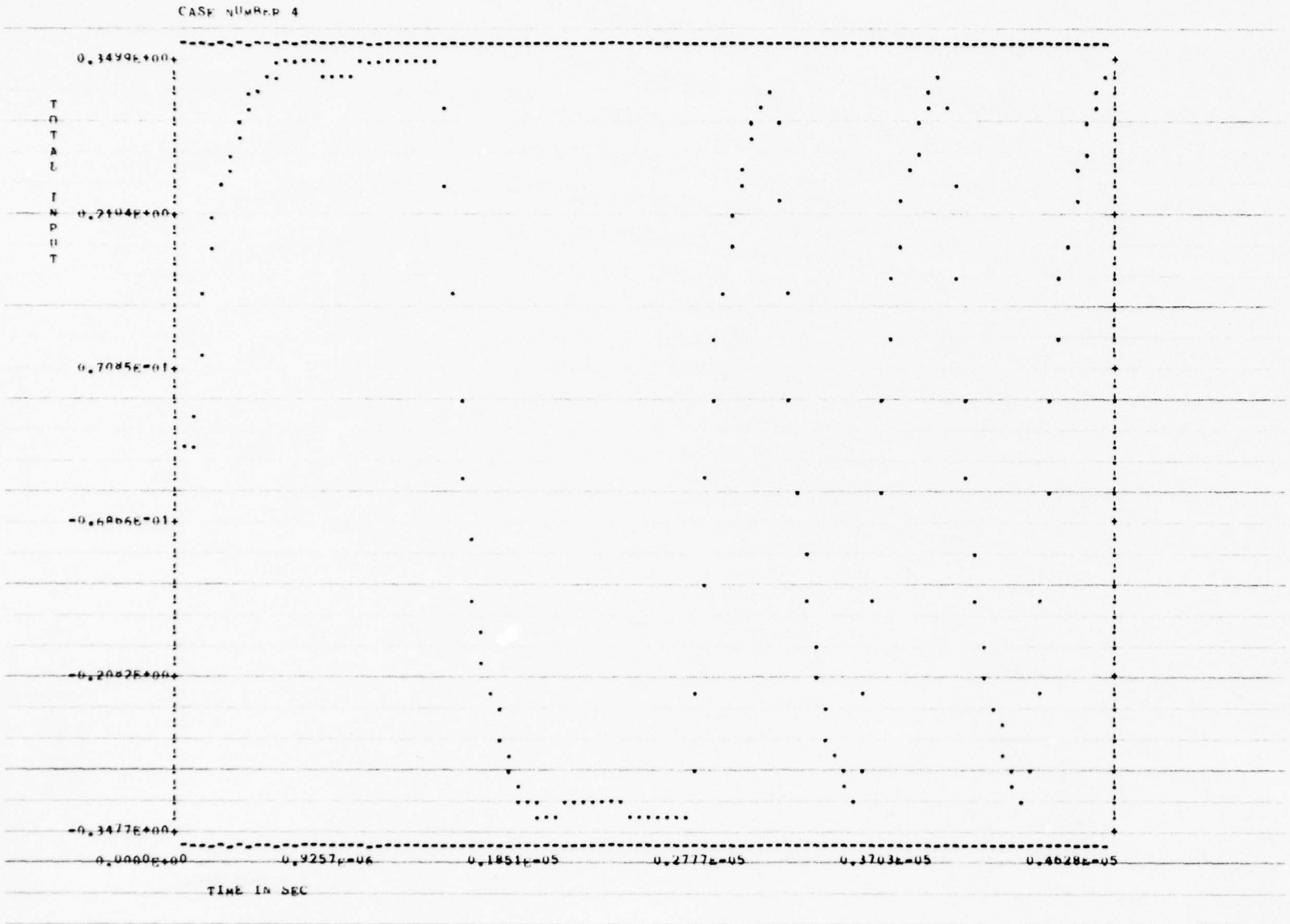

CASE NUMBER 3
GENERATOR
0.1000E+01
0.0000E+00
0.2000E+00
-0.2000E+00
-0.6000E+00
-0.1000E+01
0.0000E+00
0.9257E+06
0.1851E+05
0.2777E+05
0.3703E+05
TIME IN SEC

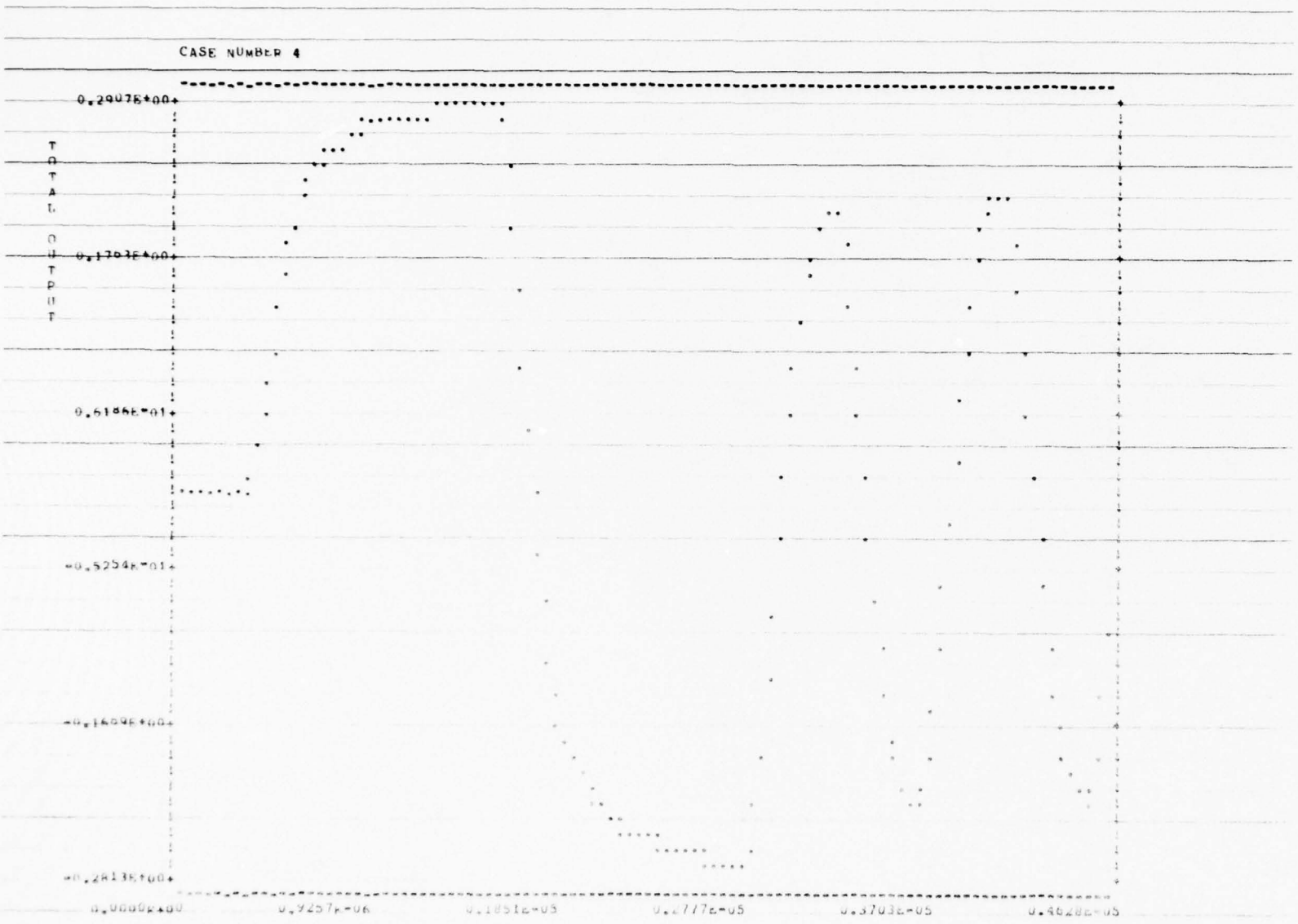
```
NEW JOB BEGINNING

$SECT DATA .0000001330   350.0   112.0   10.0    0.89200  0.93570  0.00850  0.00000  0.00000 68.00000  2200.000
$TRAN1
 GAIN1=  0.2676700    , ANSU1=  0.4953000E+15,  TWOZ=1=   8000000.    , $
$TRAN2
 GAIN2=  0.2472180    , ROOT2=  0.2000000E+08, $
$GENXFP
 GAIN3=  0.3800000    , FOLE=   8000000.    ,  REF1= -0.6600000E-01, $
$STUB
 ISTUB=3*              0,              1,              0,              1,              0,              1,              0,
          1, 11*             0,              1,              0,              1,              0,              1,
          0,           1, 3*           0,  NPSKIP=          2,  LSTUB=3*            0,             10,
          0,          10,             0,             10,             0,             10, 11*            0,
         10,           0,            10,              0,            10,              0,             10,
3*          0, $
$GENPP
 IGEN=          4,  GENMAX=  1.000000    ,  ISLOPE=  0.5000000E-07,  NCCIN=         94,  NCCF=         32,
 ZC=   68.00000    , $
$SKIN
 GI1=  0.9730000    ,  GI2=  0.7900000E-02,  GI3=  0.6065800E-02, $

PLOTPR CALLED. 24 VARIABLES SPECIFIED. 24 PLOTS REQUESTED.
```

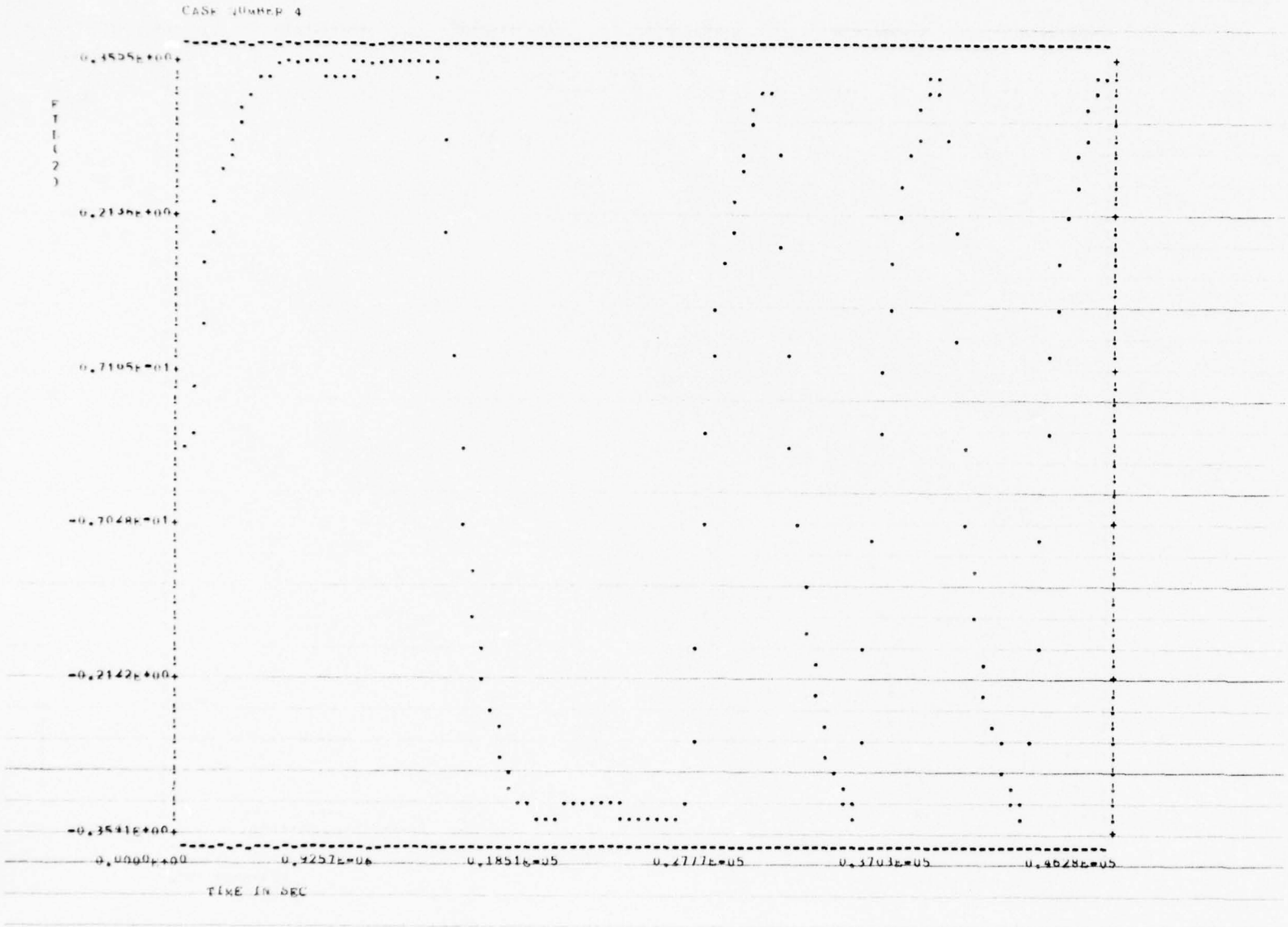
DATA BUS SIMULATION OF A 68 OHM TWISTED SHIELDED PAIR

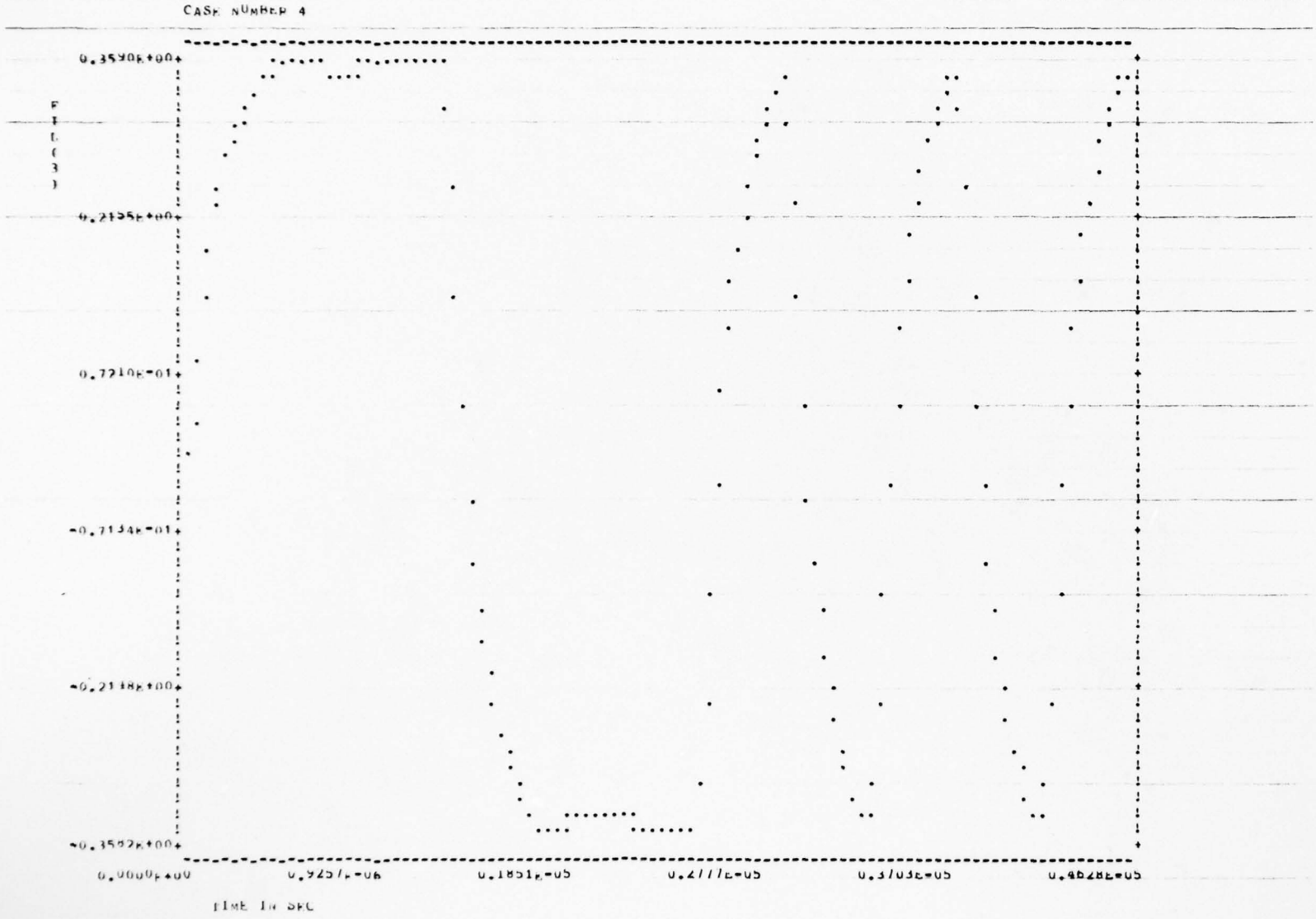
THE MINIMUM-MAXIMUM VALUES FOR THE VARIABLES IN CURVE 23 ARE EQUAL


CASE NUMBER 4
TIME IN SEC
0.4628E+05
0.3703E+05
0.2777E+05
0.1851E+05
0.9257E+04
0.0000E+00
0.0000E+00
0.9257E+04
0.1851E+05
0.2777E+05
0.3703E+05
0.4628E+05
TIME IN SEC

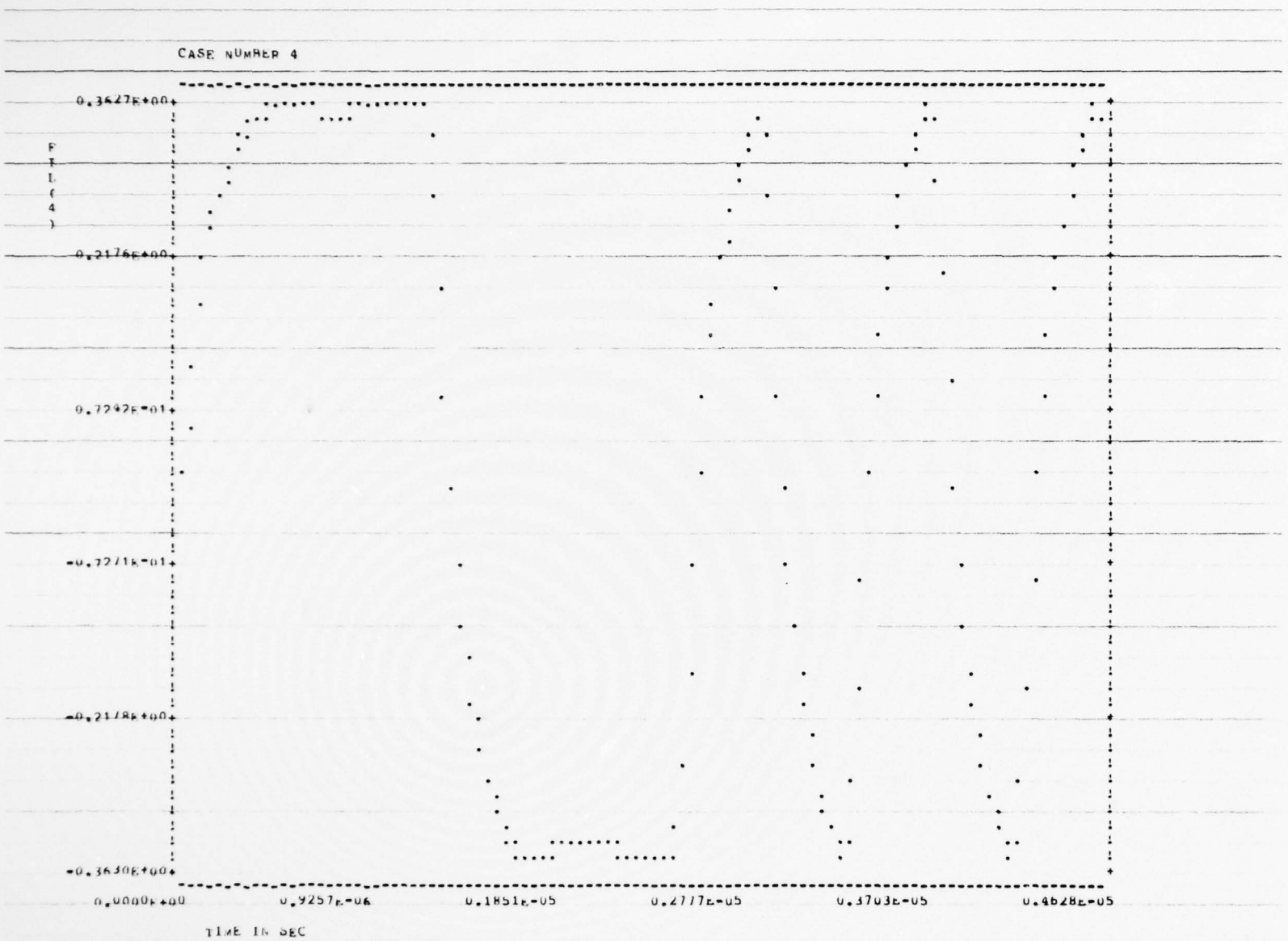

CASE NUMBER 4
TOTAL INPUT
0.3499E+00
0.2104E+00
0.7085E-01
-0.6806E-01
-0.2082E+00
-0.3477E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

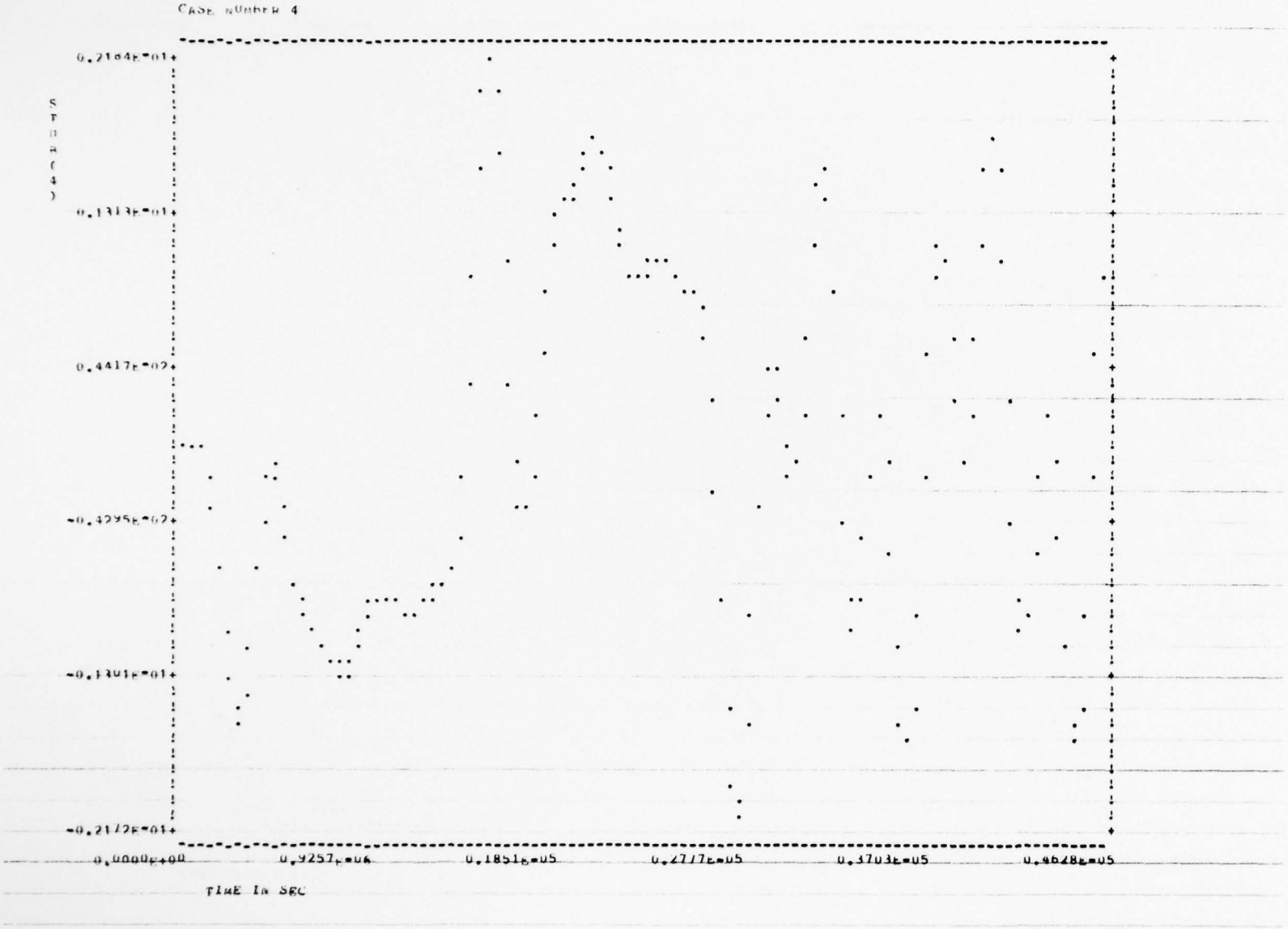

CASE NUMBER 4
0.2907E+00
TOTAL OUTPUT
0.1703E+00
0.5186E-01
-0.5254E-01
-0.1609E+00
-0.2813E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

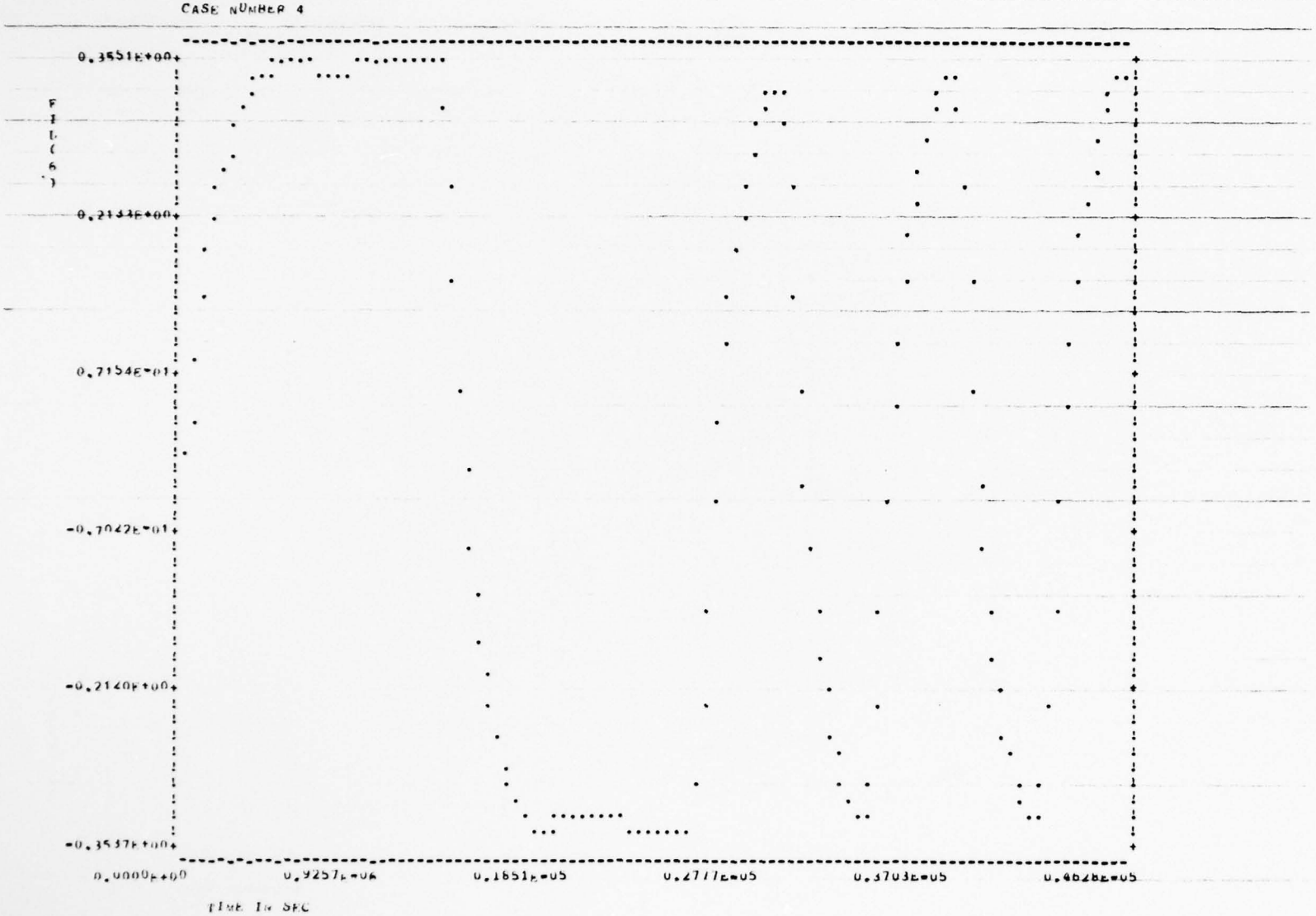

CASE NUMBER 4
0.4535E+00
0.2135E+00
0.7105E-01
-0.7048E-01
-0.2142E+00
-0.3541E+00
F T L (2)
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

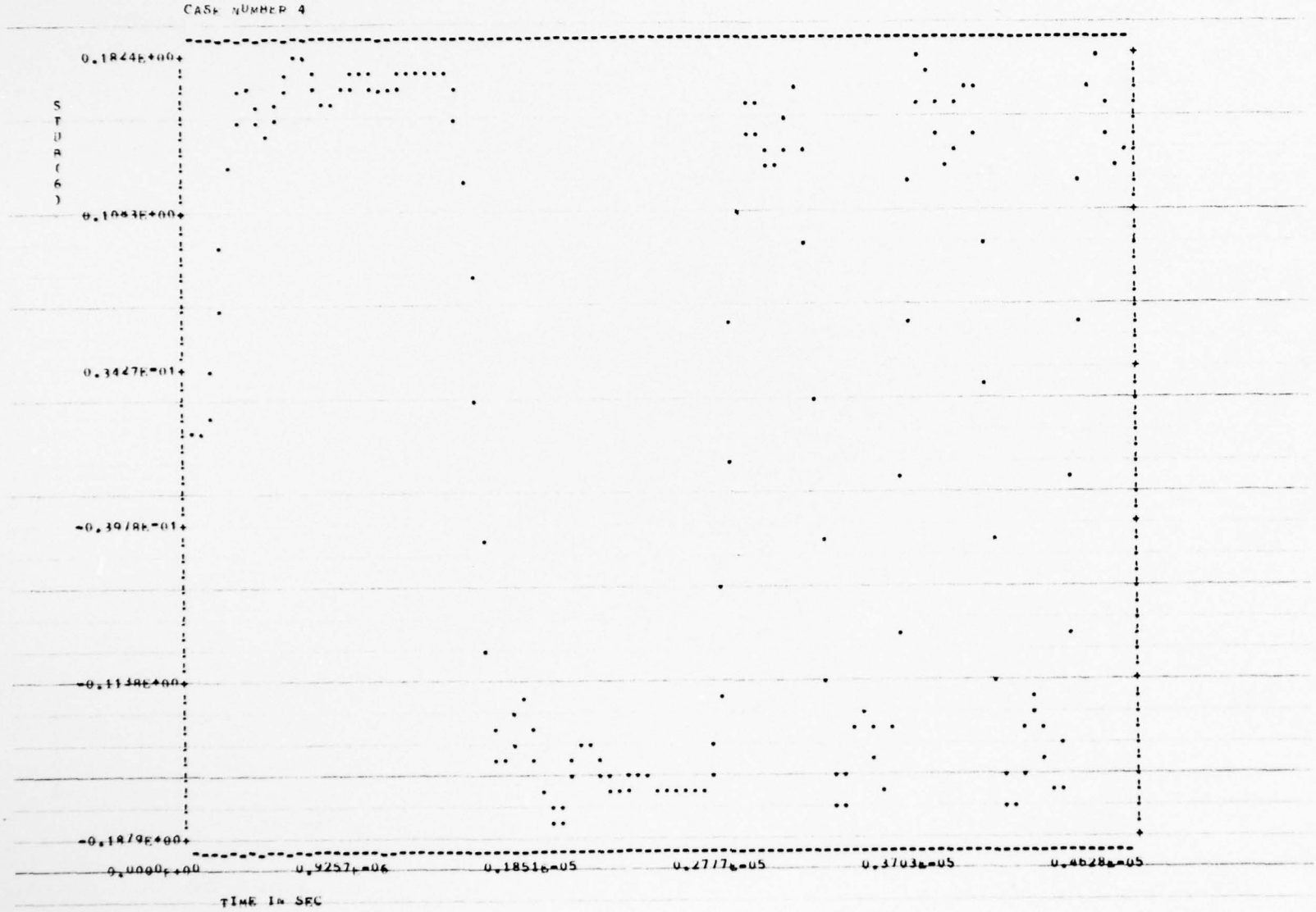

CASE NUMBER 4
0.3590E+00
0.2135E+00
0.7210E-01
-0.7134E-01
-0.2148E+00
-0.3582E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

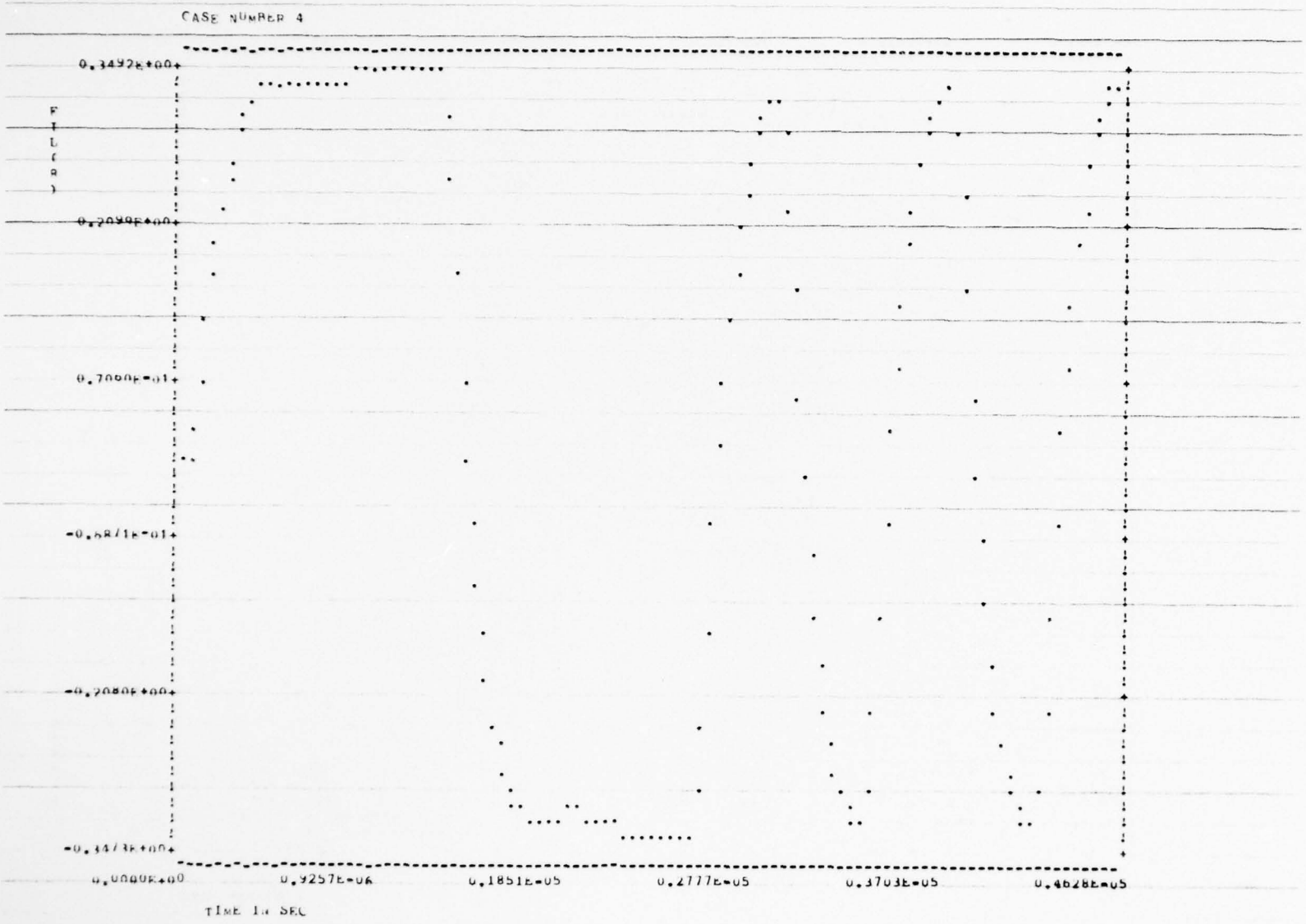
THE CORRESPONDING VALUES FOR THE VARIABLES IN CURVE 6 ARE EQUAL

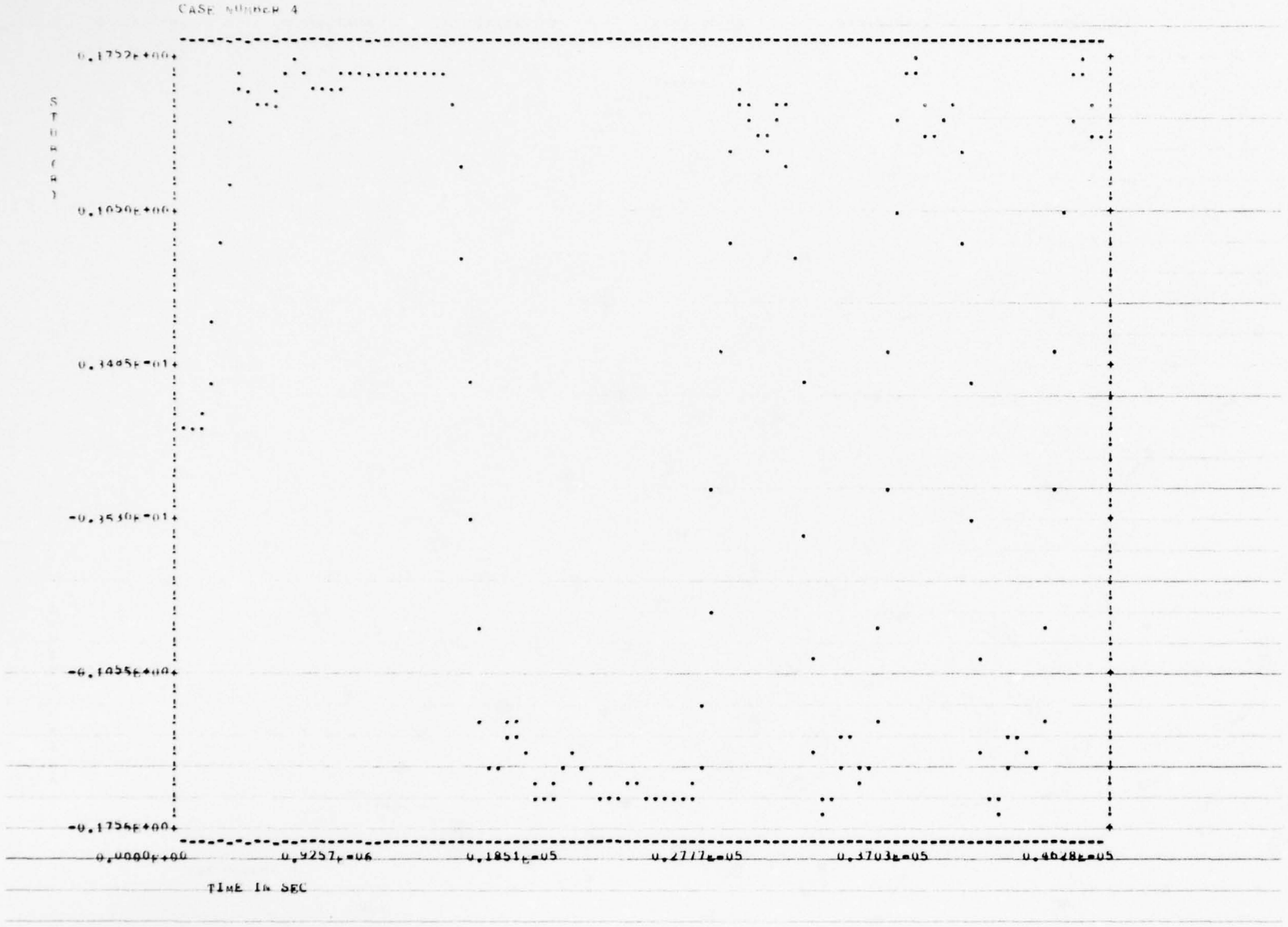

CASE NUMBER 4
0.3627E+00
F
I
L
(
4
)
0.2176E+00
0.7242E-01
-0.7271E-01
-0.2178E+00
-0.3630E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

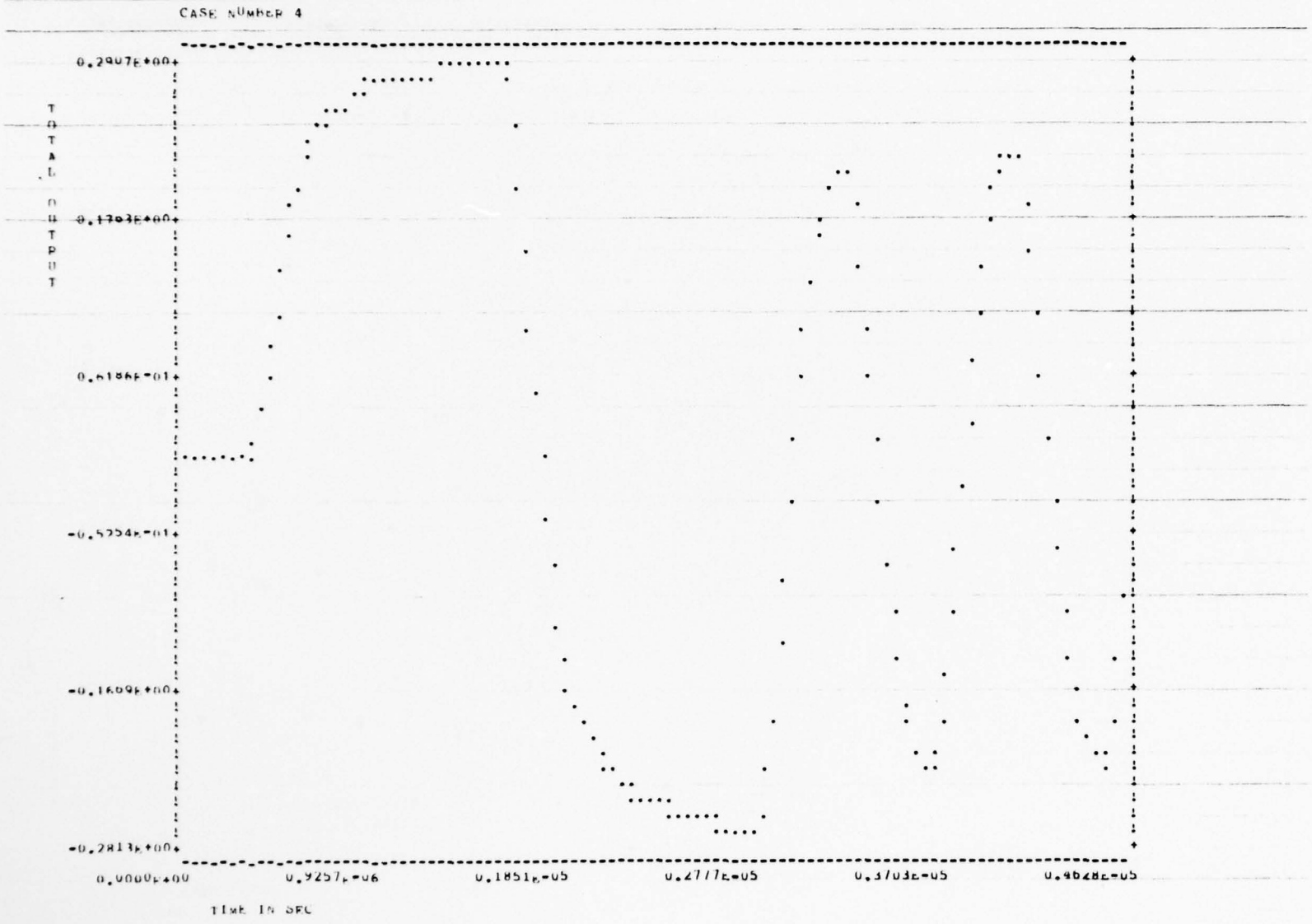

CASE NUMBER 4
0.2104E+01
0.1313E+01
0.4417E-02
-0.4295E-02
-0.1301E+01
-0.2172E+01
STRAIN(4)
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

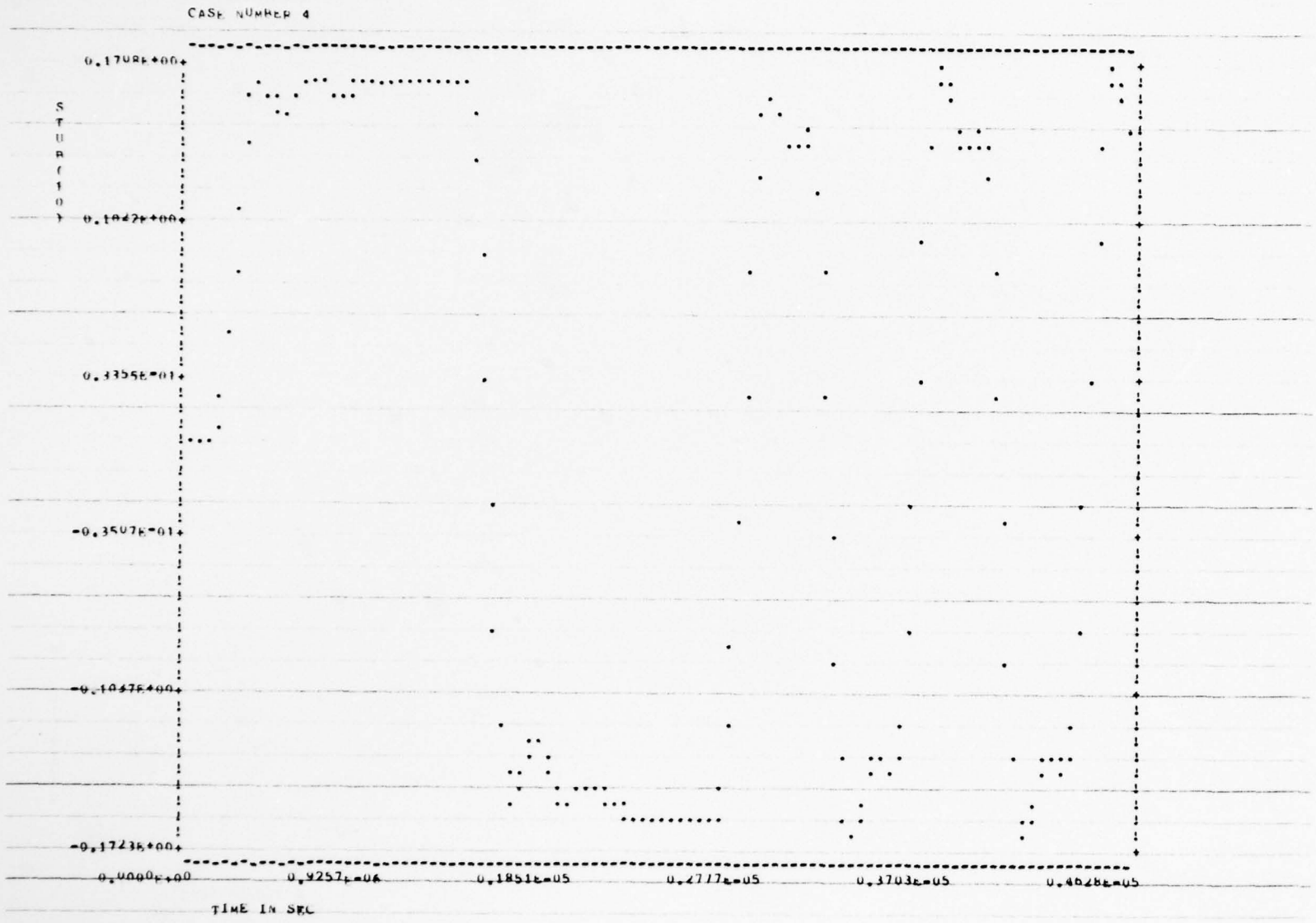

CASE NUMBER 4
0.3651E+00
0.2134E+00
0.7154E-01
-0.7042E-01
-0.2140E+00
-0.3537E+00
0.0000E+00
0.9257E+04
0.1851E+05
0.2777E+05
0.3703E+05
0.4628E+05
TIME IN SEC

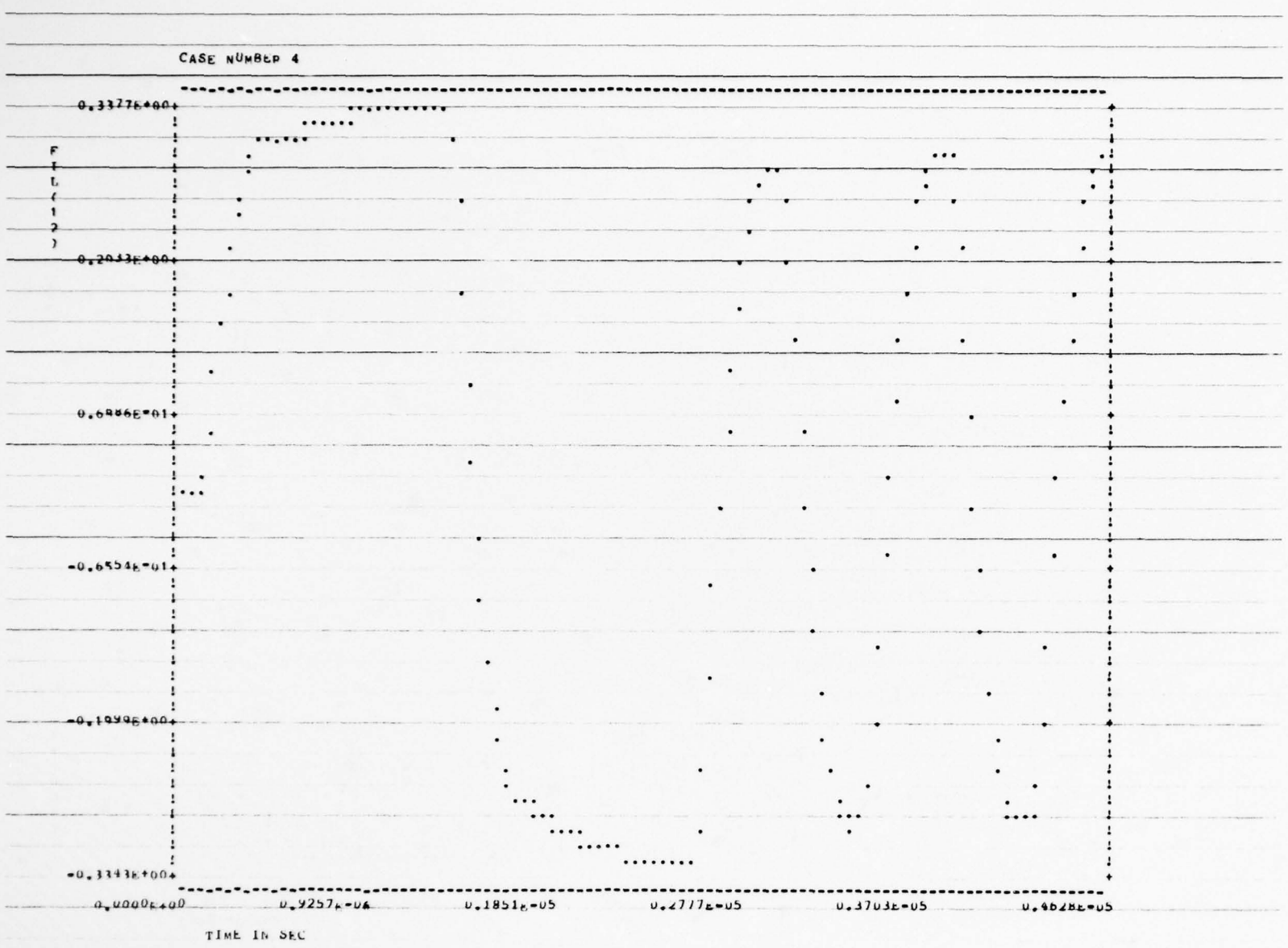

CASE NUMBER 4
STRAC(6)
0.1824E+00
0.1043E+00
0.3447E-01
-0.3978E-01
-0.1138E+00
-0.1879E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

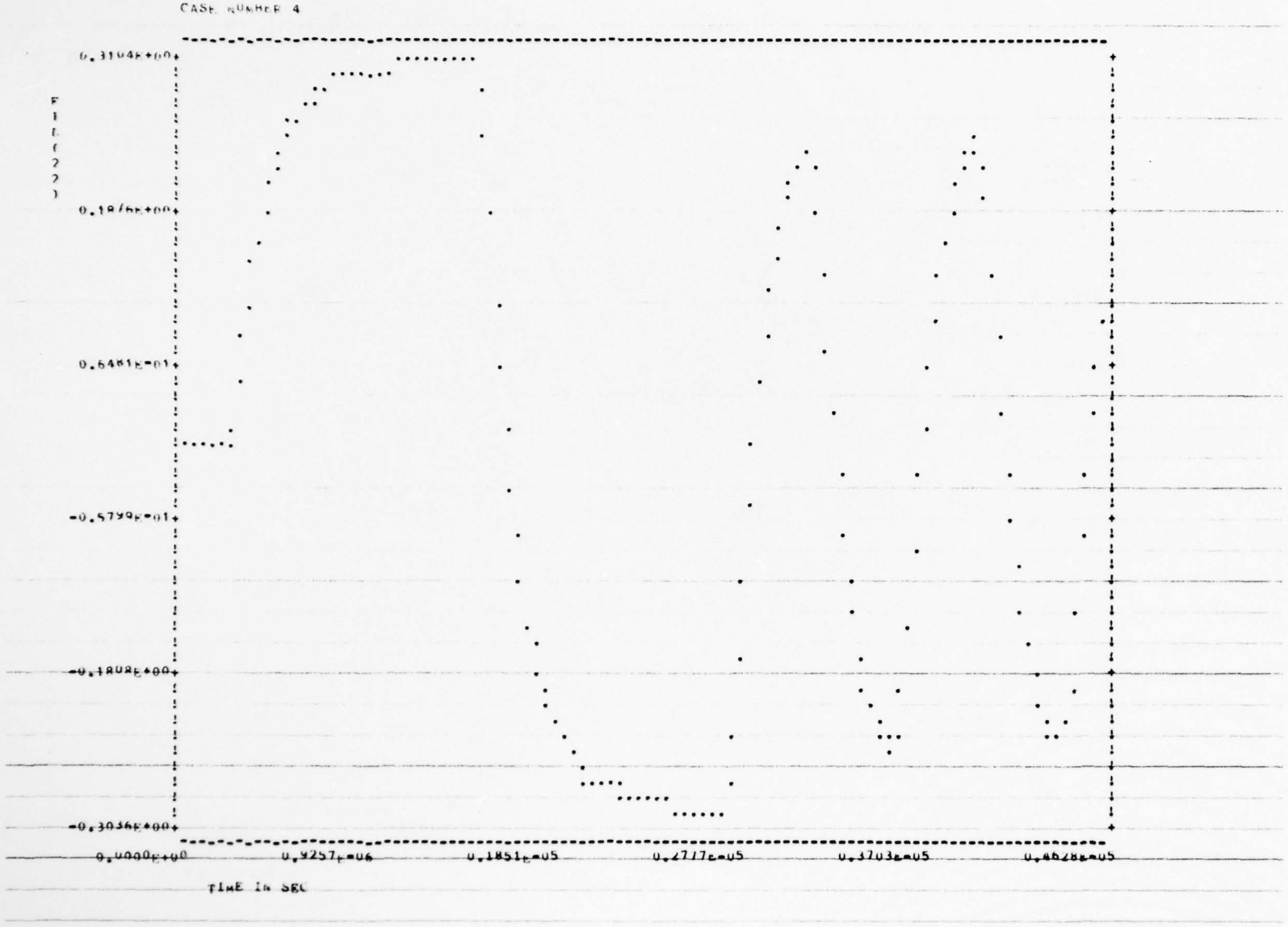

CASE NUMBER 4
0.3492E+00
0.2094E+00
0.7000E-01
-0.6871E-01
-0.2080E+00
-0.3473E+00
F
I
L
(
R
)
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

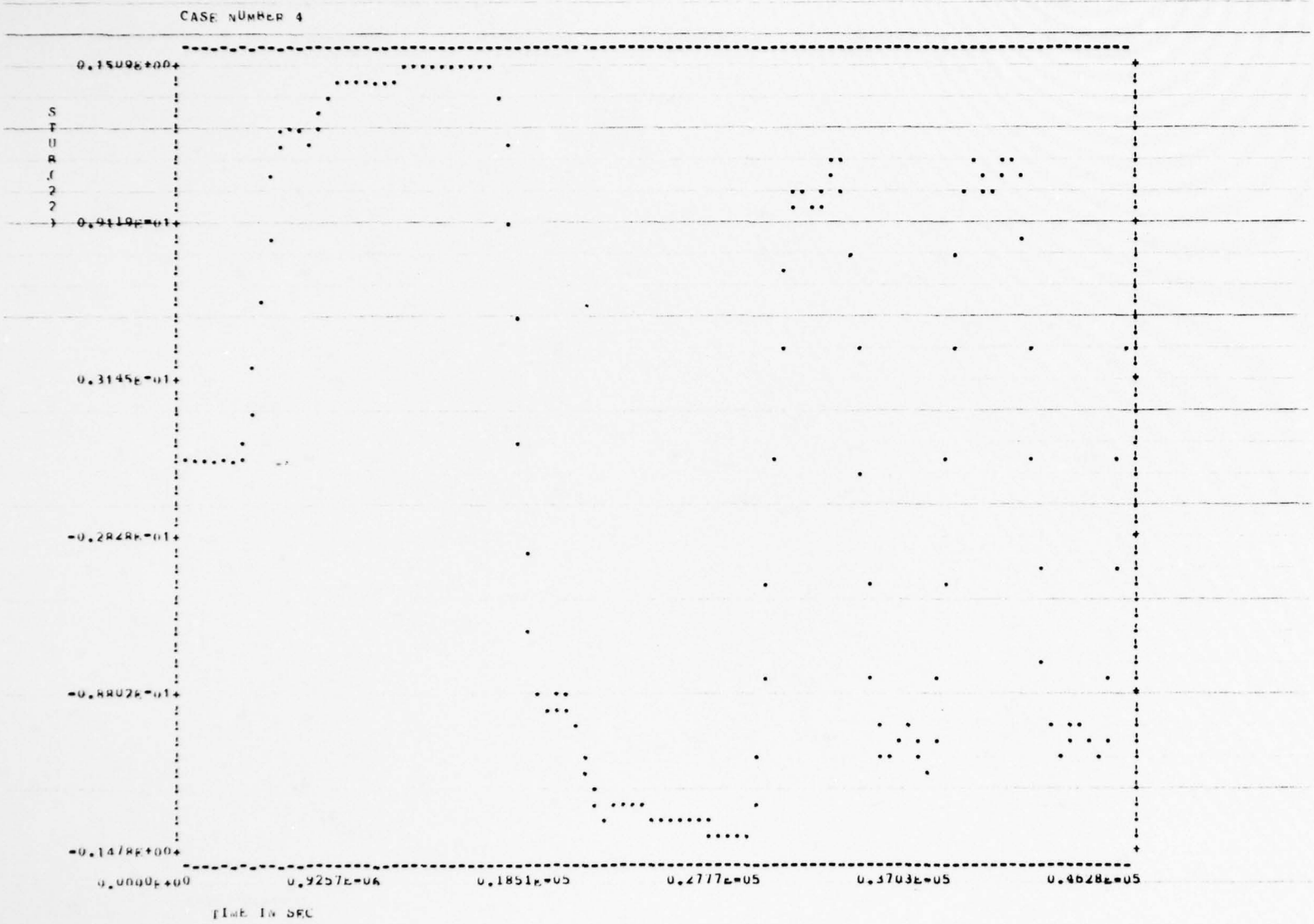

CASE NUMBER 4
STERY
0.1732E+00
0.1050E+00
0.3465E-01
-0.3530E-01
-0.1035E+00
-0.1736E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

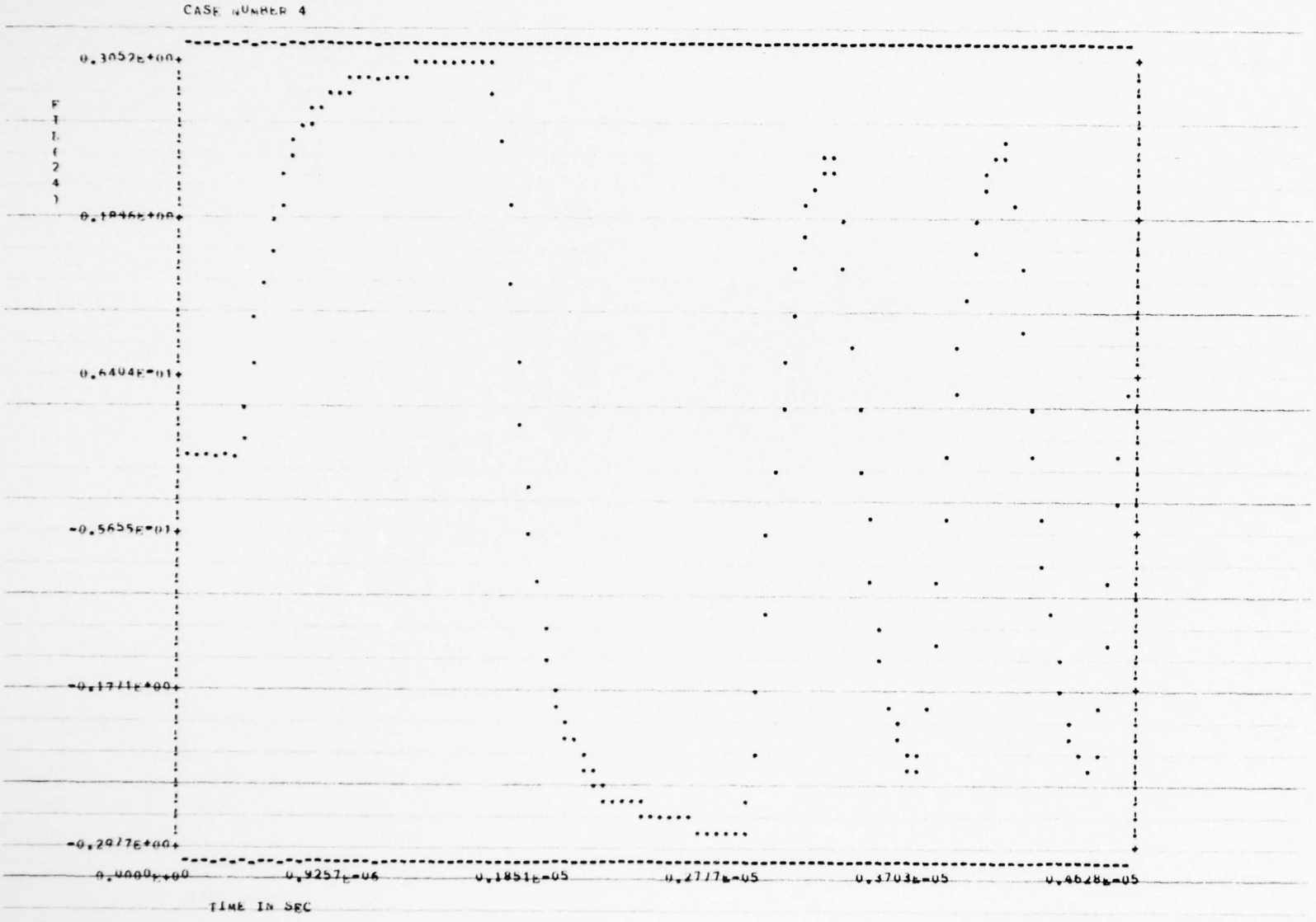

CASE NUMBER 4
TOTAL OUTPUT
0.2907E+00
0.1703E+00
0.6186E-01
-0.5254E-01
-0.1669E+00
-0.2813E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

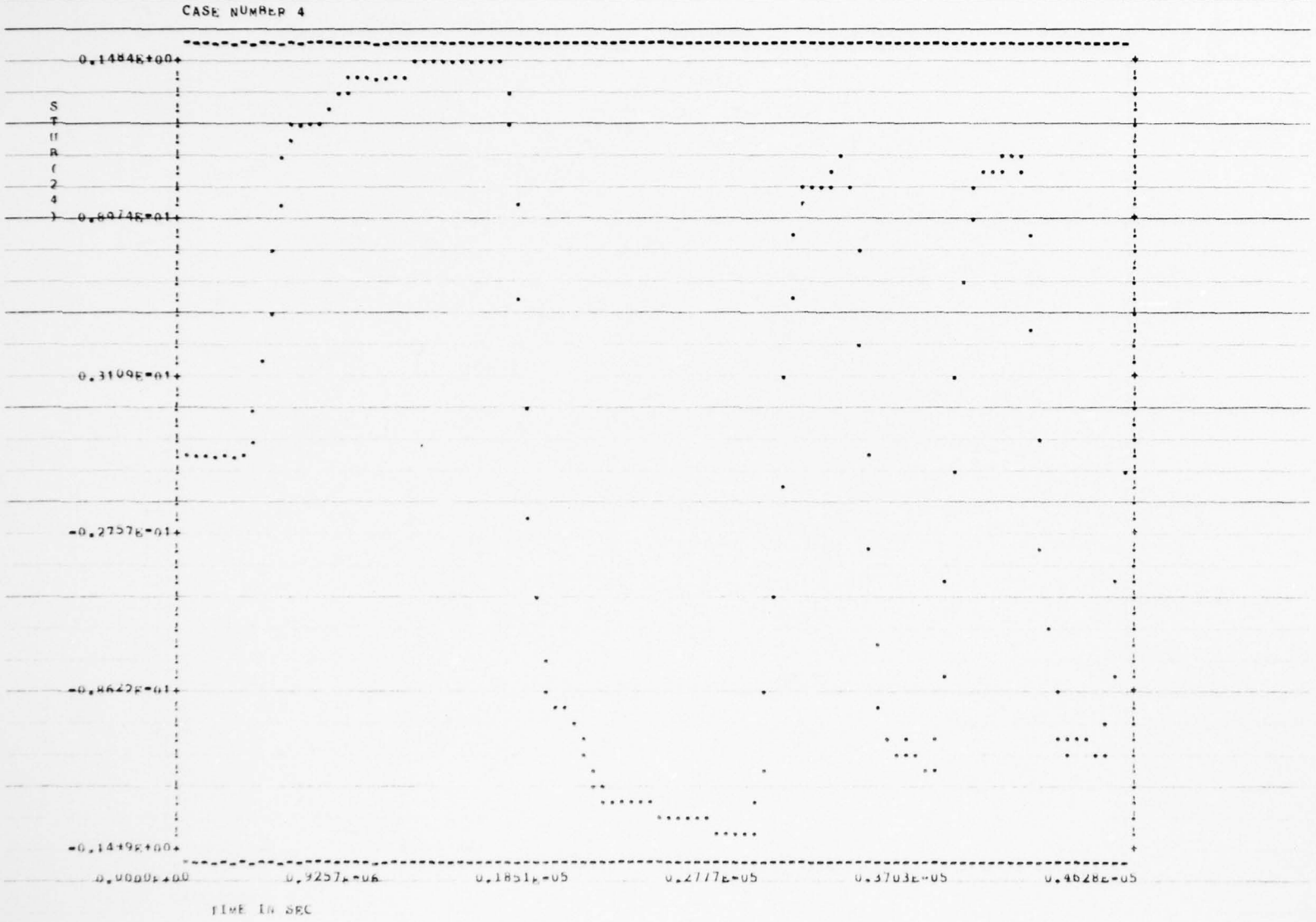

CASE NUMBER 4
STUB(10)
0.1708E+00
0.1042E+00
0.1355E-01
-0.3507E-01
-0.1047E+00
-0.1723E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC


CASE NUMBER 4
F
I
(
1
2
)
0.3327E+00
0.2043E+00
0.6886E-01
-0.6554E-01
-0.1998E+00
-0.3343E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC


CASE NUMBER 4
F(I,J,2)
0.3104E+00
0.1876E+00
0.6481E-01
-0.5799E-01
-0.1808E+00
-0.3036E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2717E-05
0.3703E-05
0.4628E-05
TIME IN SEC

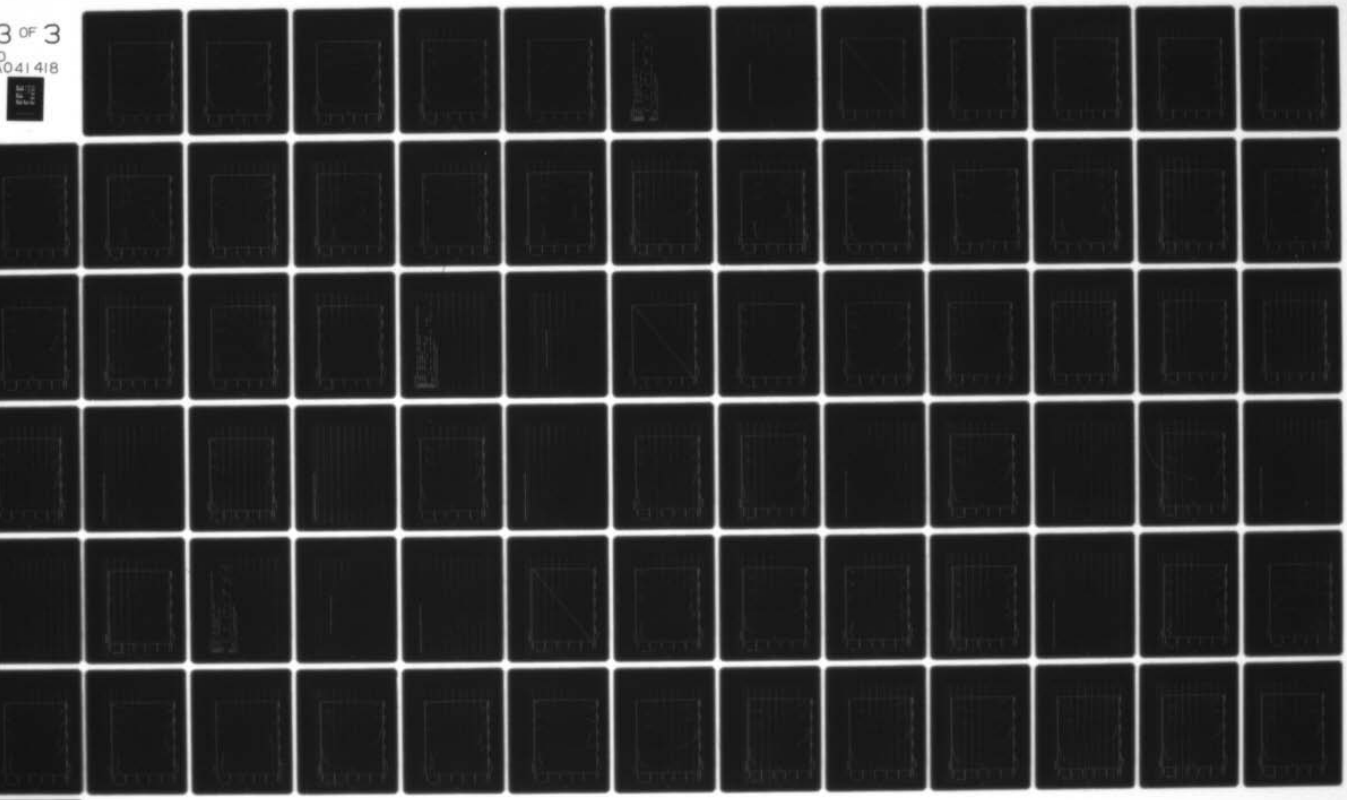

CASE NUMBER 4
0.15098E+00
0.9119E-01
0.3145E-01
-0.2828E-01
-0.8802E-01
-0.1478E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC


CASE NUMBER 4
F(24)
0.3052E+00
0.1846E+00
0.6404E-01
-0.5655E-01
-0.1711E+00
-0.2917E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC


CASE NUMBER 4
STRAIN (24)
0.1484E+00
0.6974E-01
0.3109E-01
-0.2757E-01
-0.8642E-01
-0.1449E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

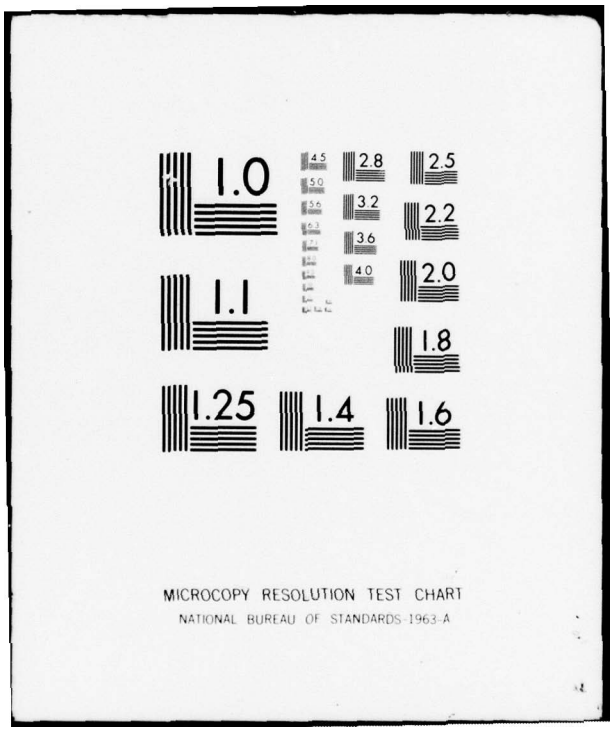
AD-A041 418 AIR FORCE AVIONICS LAB WRIGHT-PATTERSON AFB OHIO F/G 9/2
A USERS GUIDE TO THE DATA BUS NETWORK SIMULATOR (DBNS) PROGRAM.(U)
APR 77 J E CAMP
UNCLASSIFIED AFAL-TR-77-47 NL

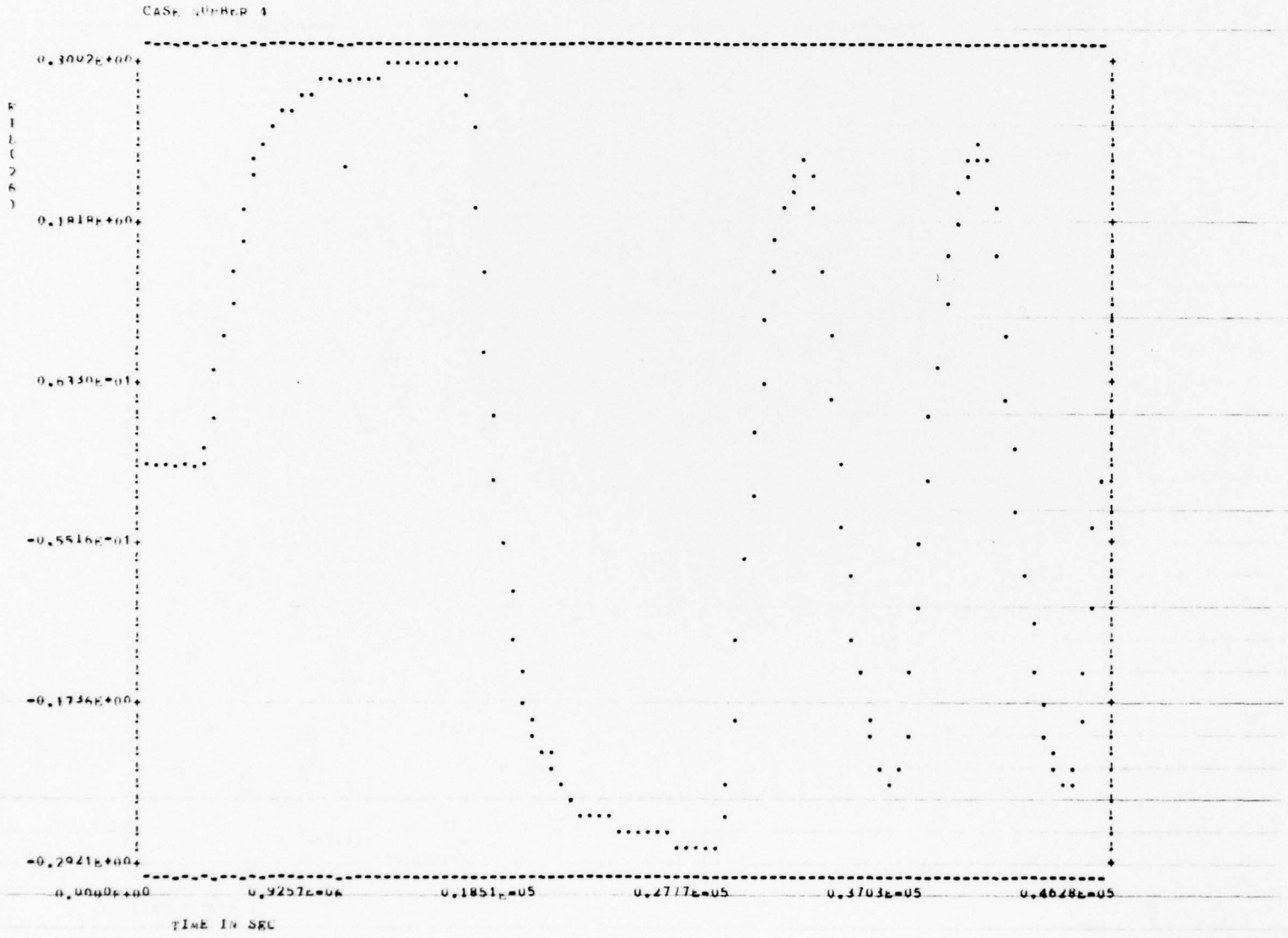
3 OF 3
AD A041 418

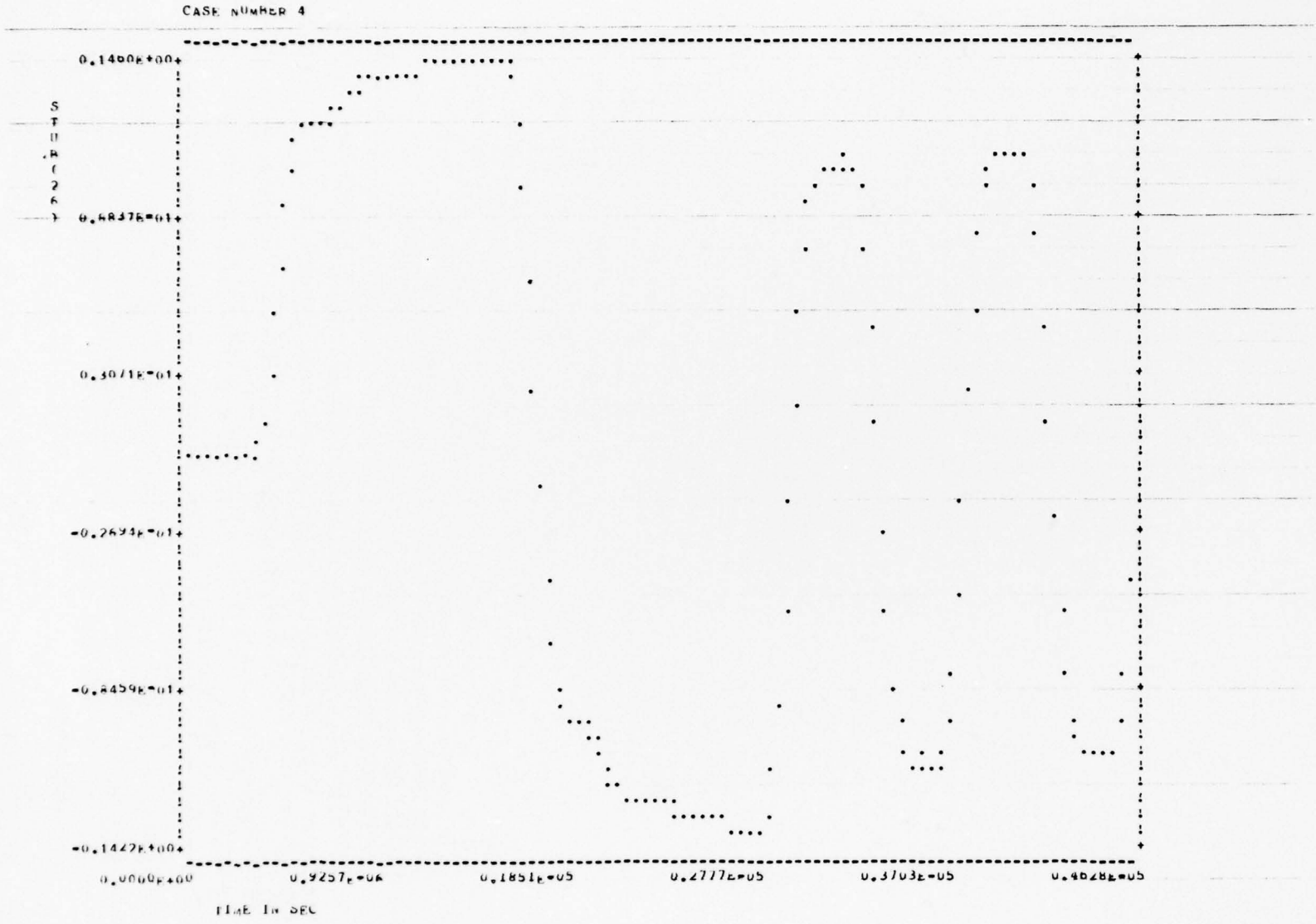


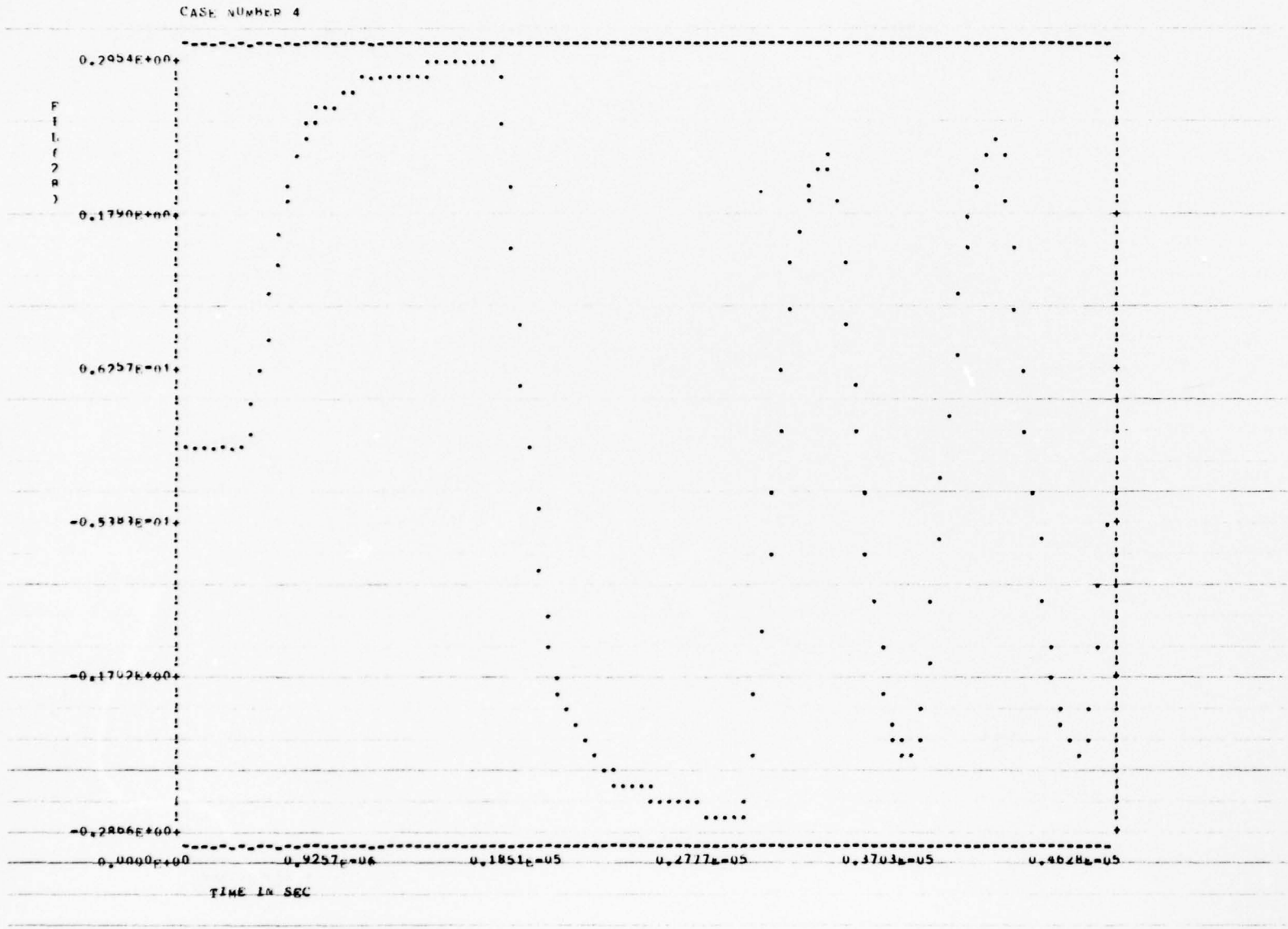
END

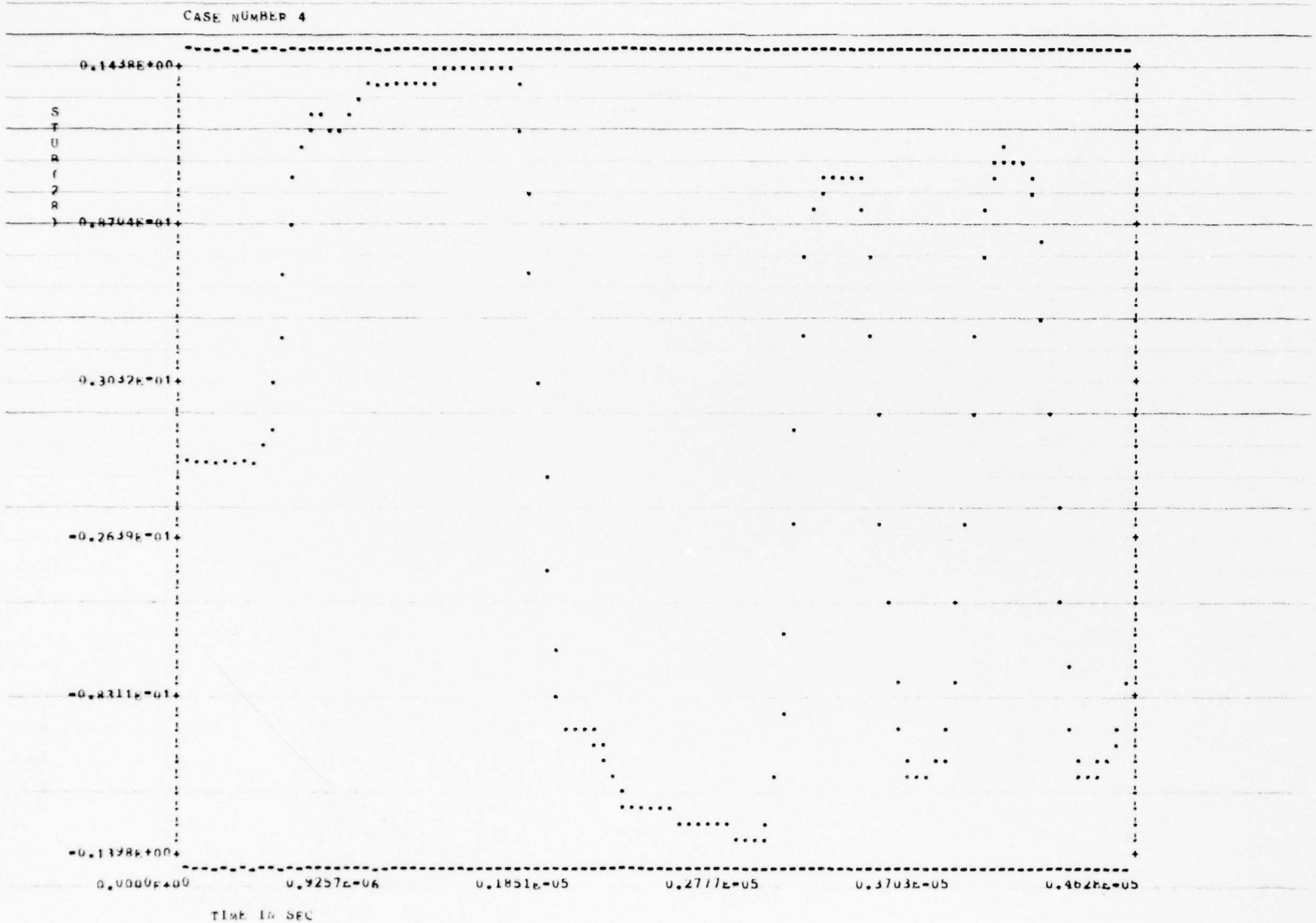
DATE FILMED
7-77

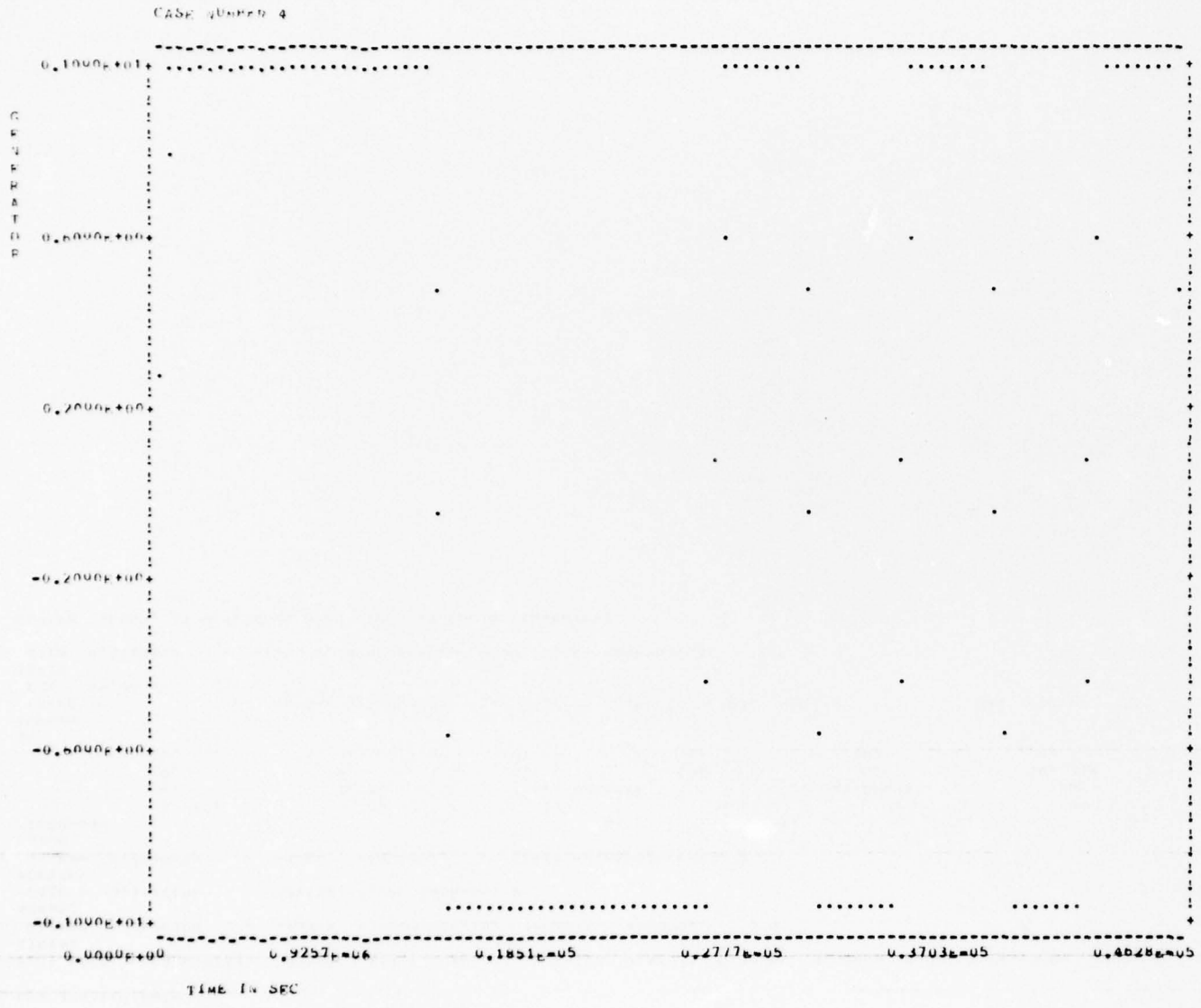

1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
4.5
5.0
5.6
6.3
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A


CASE NUMBER 1
0.3092E+00
0.1818E+00
0.6330E-01
-0.5516E-01
-0.1736E+00
-0.2941E+00
F(I,26)
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC


CASE NUMBER 4
0.1400E+00
0.6837E-01
0.3071E-01
-0.2694E-01
-0.8459E-01
-0.1442E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

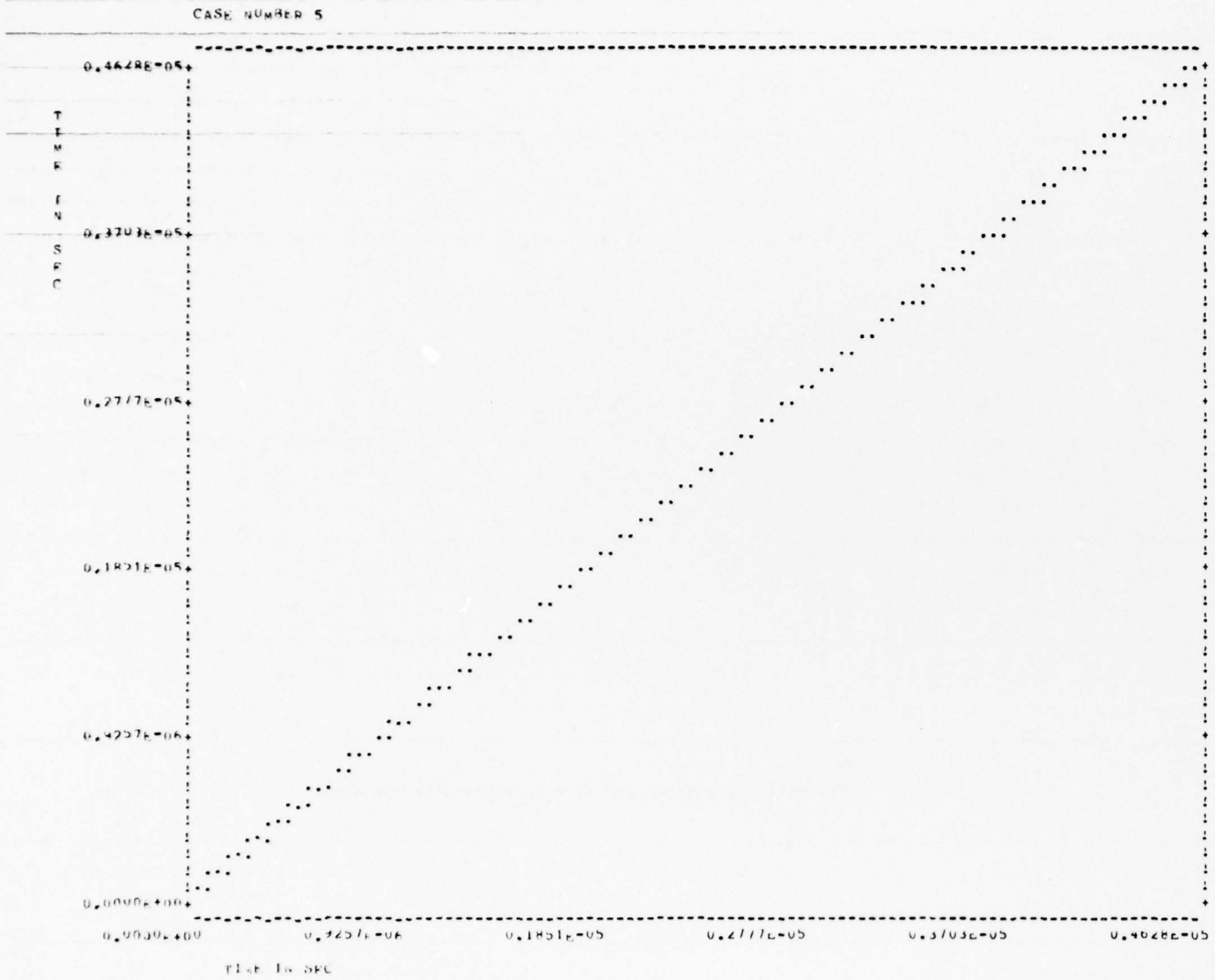

CASE NUMBER 4
0.2954E+00
0.1790E+00
0.6257E-01
-0.5383E-01
-0.1702E+00
-0.2866E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

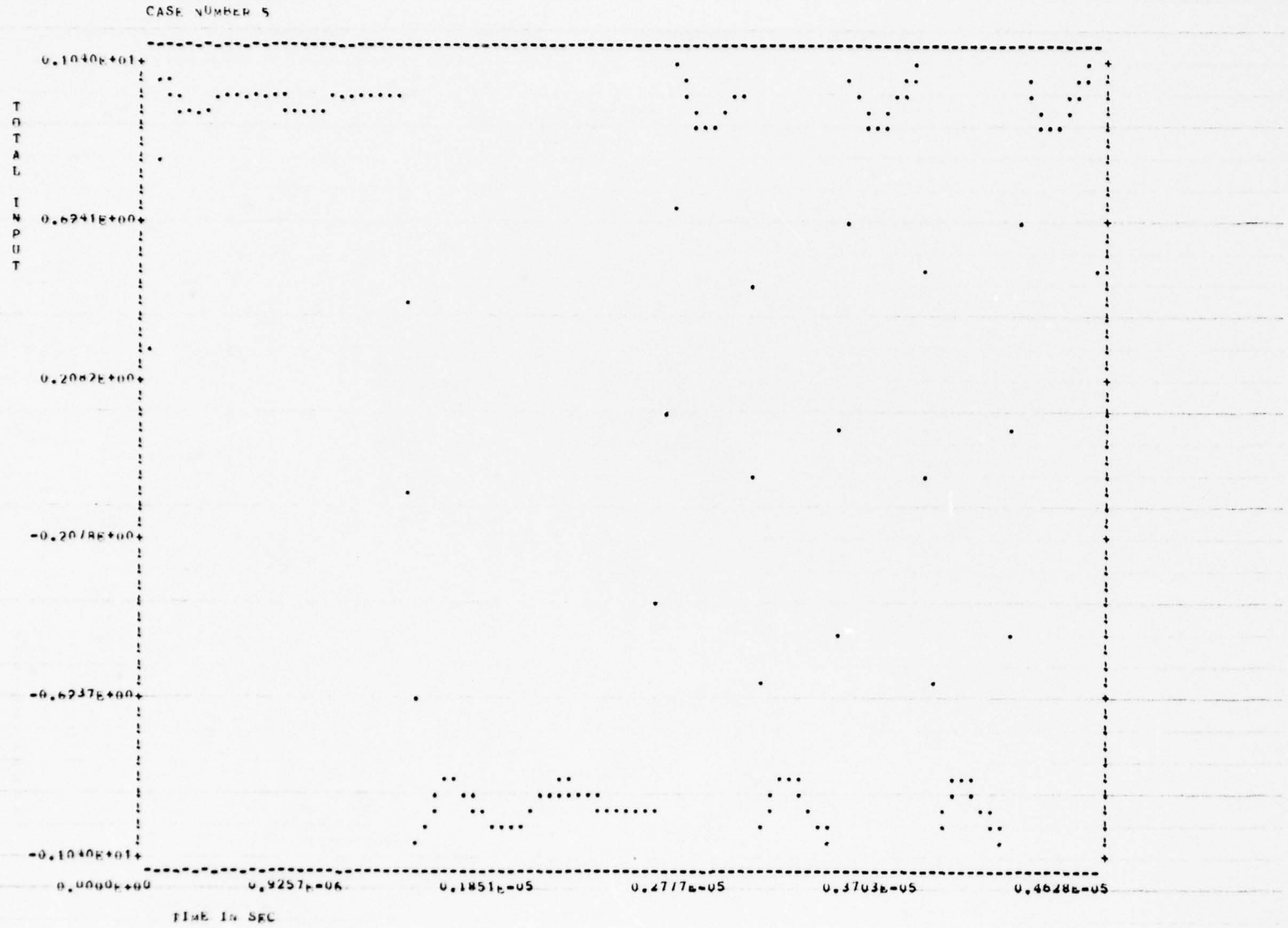

CASE NUMBER 4
0.1438E+00
STUB(2,8)
0.8704E-01
0.3032E-01
-0.2639E-01
-0.8311E-01
-0.1398E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

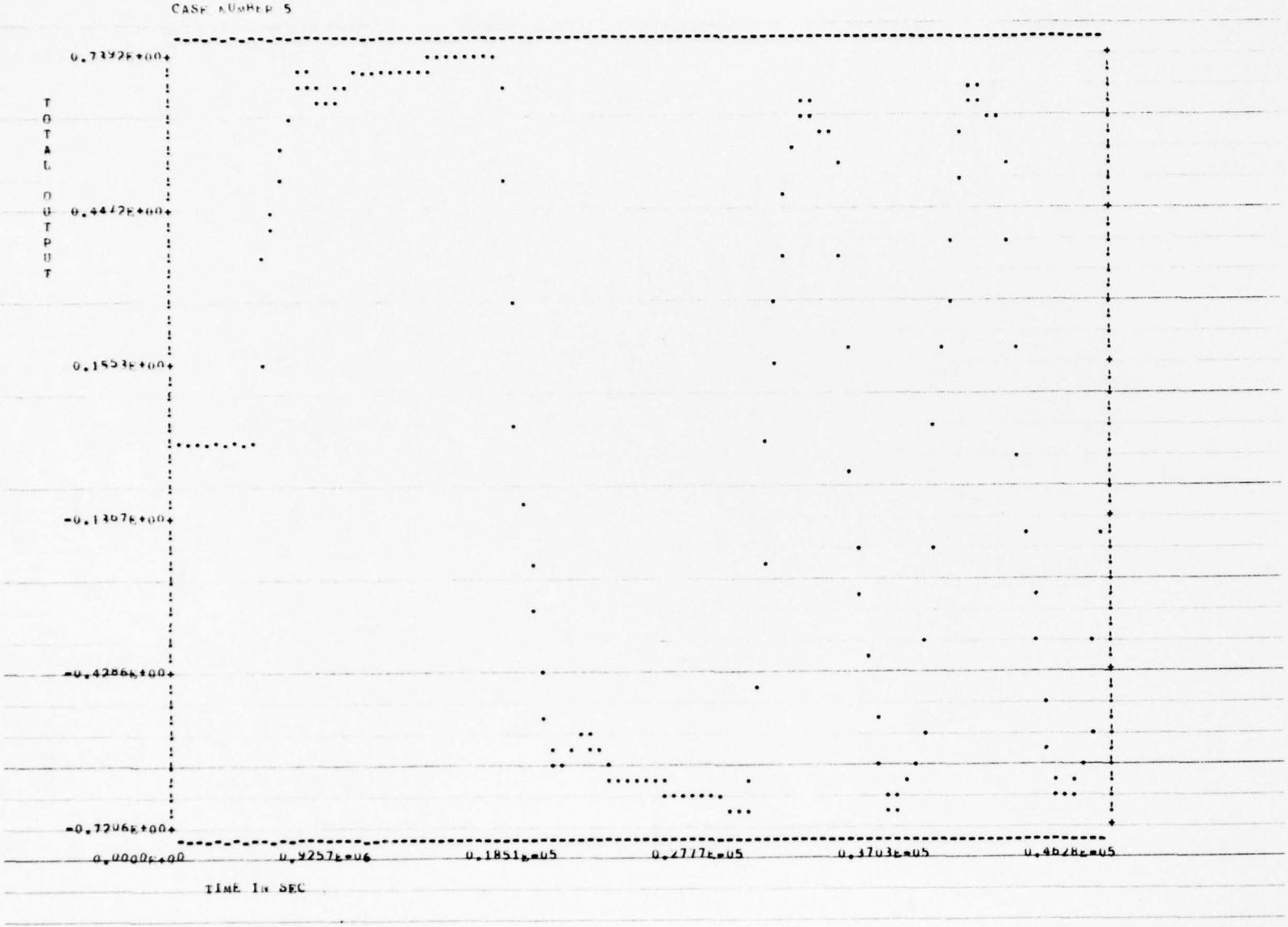

CASE NUMBER 4
0.1000E+01
0.6000E+00
0.2000E+00
-0.2000E+00
-0.6000E+00
-0.1000E+01
0.0000E+00
0.9257E+04
0.1851E+05
0.2777E+05
0.3703E+05
0.4628E+05
TIME IN SEC

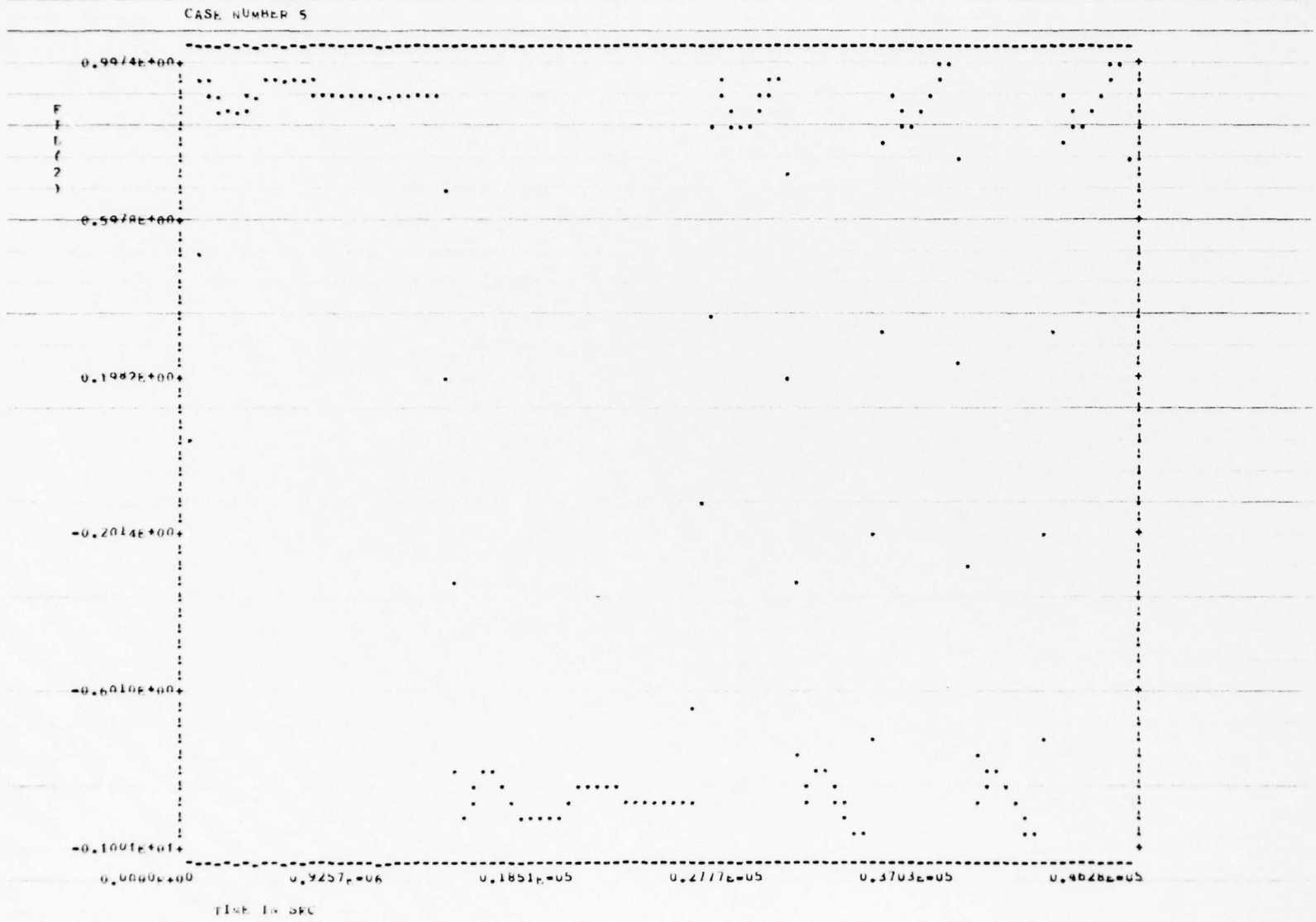
```
NEW JOB BEGINNING

$SCT DATA  .000000001330   350.0   112.0   10.0    0.89200  0.93570  0.00850  0.00000  0.00000 68.00000  2200.000
$TRAN1
 GAIN1=  0.2676700    ,  ANSW1=  0.4953000E+15,  IWUZW1=   8000000.    , $
$TRAN2
 GAIN2=  0.2472180    ,  RDOT2=  0.2000000E+08, $
$GENXFR
 GAIN3=  0.3800000    ,  POLE=   8000000.    ,  REF1= -0.8600000E-01, $
$STUB
 ISTUB=3*              0,              1,              0,              1,              0,              1,
              1, 11*             0,              1,              0,              1,              0,              1,
              0,              1, 3*           0,  NPSKIP=             2,  LS1OB=3*            0,             10,
              0,             10,             0,             10,             0,             10, 11*            0,
             10,              0,             10,             0,             10,             0,             10,
 3*           0, $
$GENFR
 IGEN=           0,  GENMAX=   1.000000    ,  ISLOPE=  0.5000000E-07,  NCC1N=          94,  NCC2=          32,
 ZG=   68.00000    , $
$SKIN
 GI1=  0.9730000    ,  GI2=  0.7900000E-02,  GI3=  0.8085800E-02, $

PLOTFR CALLED. 24 VARIABLES SPECIFIED. 24 PLOTS REQUESTED.
```

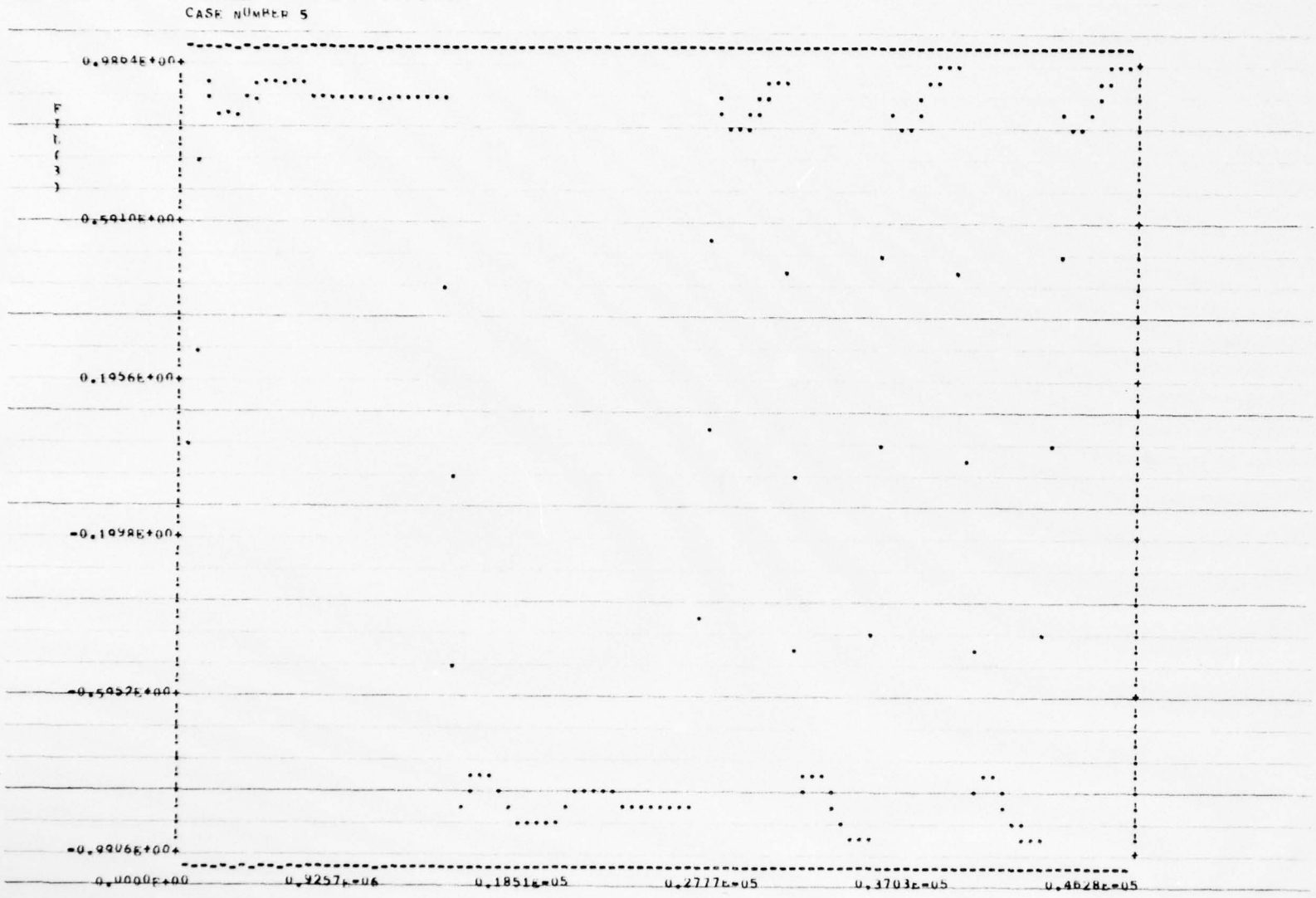
DATA BUS SIMULATION OF A 68 OHM TWISTED SHIELDED PAIR


CASE NUMBER 5
TIME IN SEC
0.4628E+05
0.3703E+05
0.2777E+05
0.1851E+05
0.9257E+04
0.0000E+00
0.0000E+00
0.9257E+04
0.1851E+05
0.2777E+05
0.3703E+05
0.4628E+05
TIME IN SEC

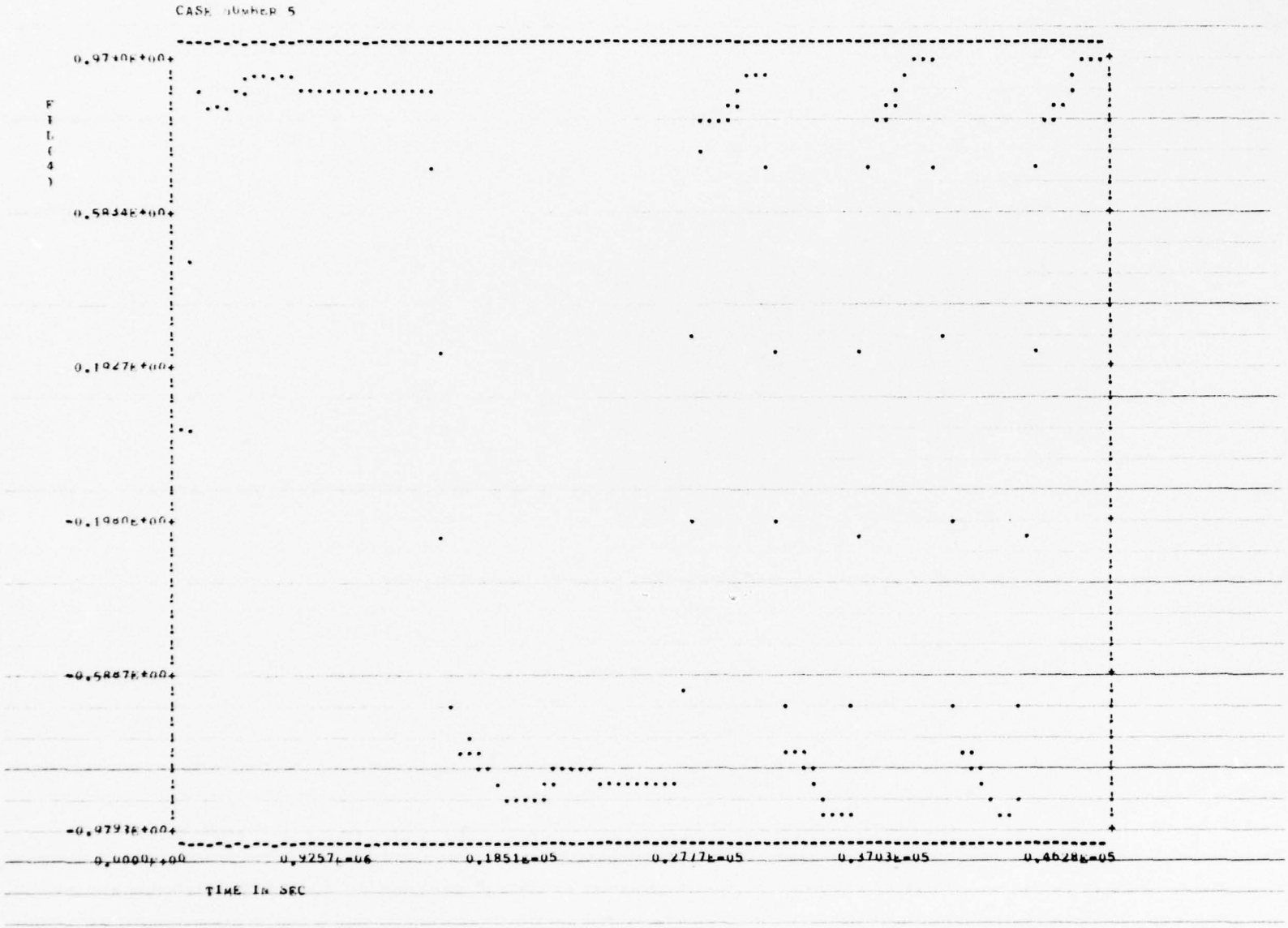

CASE NUMBER 5
TOTAL INPUT
0.1040E+01
0.6241E+00
0.2082E+00
-0.2078E+00
-0.6237E+00
-0.1040E+01
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

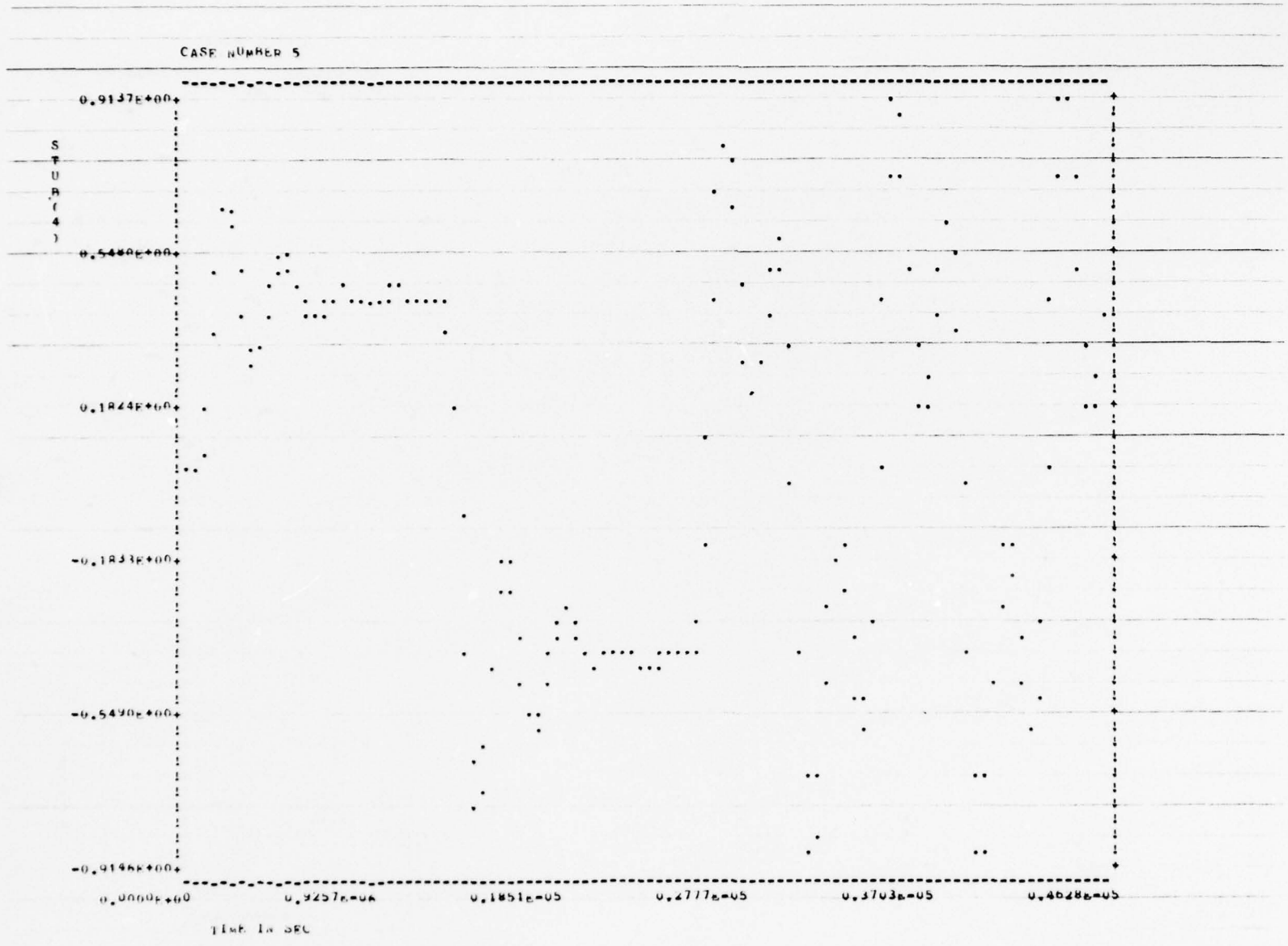

CASE NUMBER 5
TOTAL OUTPUT
0.7392E+00
0.4442E+00
0.1553E+00
-0.1307E+00
-0.4286E+00
-0.7206E+00
0.0000E+00
0.9257E+06
0.1851E+05
0.2777E+05
0.3703E+05
0.4628E+05
TIME IN SEC

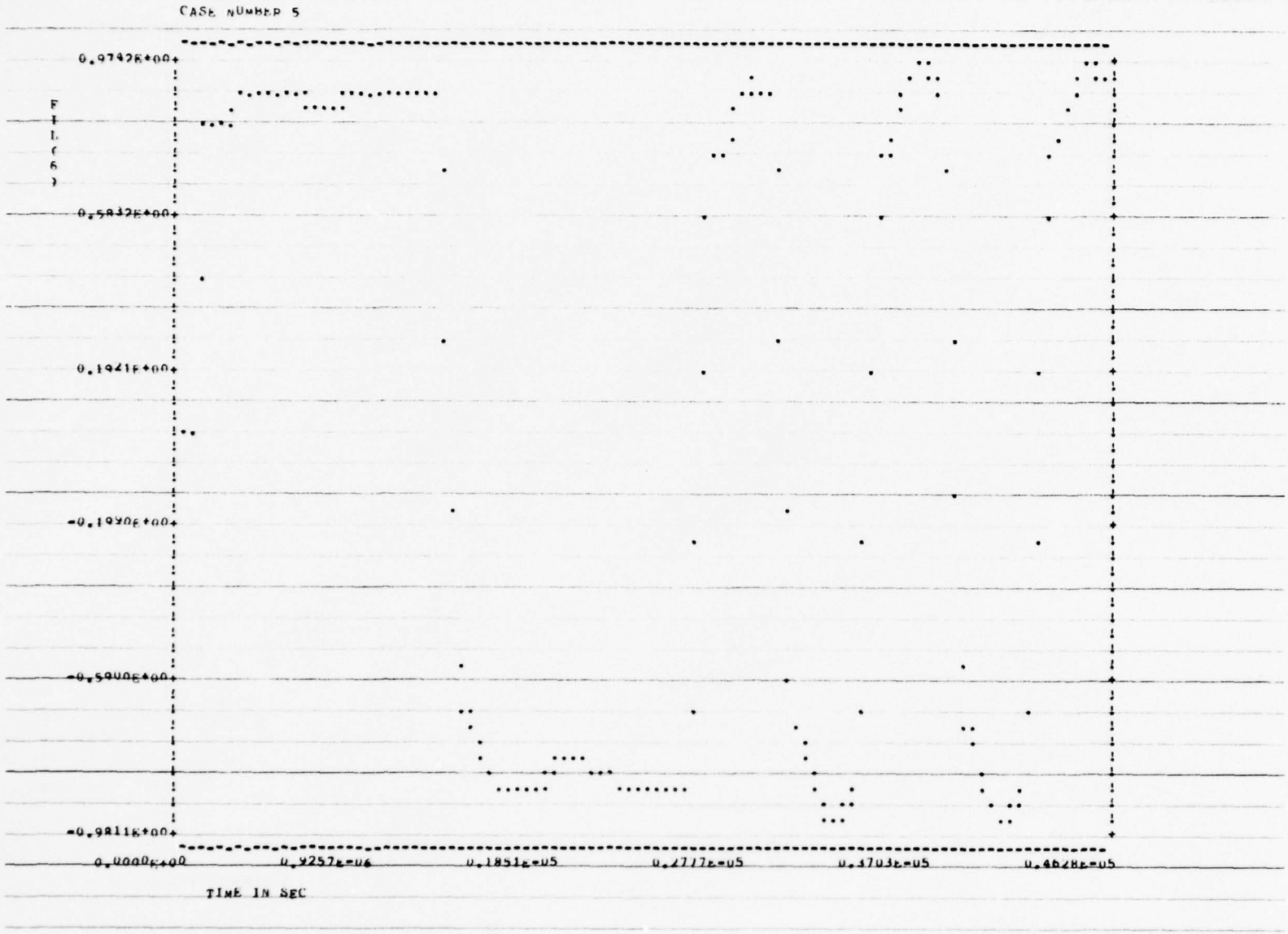

CASE NUMBER 5
F(2)
0.9974E+00
0.5978E+00
0.1982E+00
-0.2014E+00
-0.6010E+00
-0.1001E+01
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

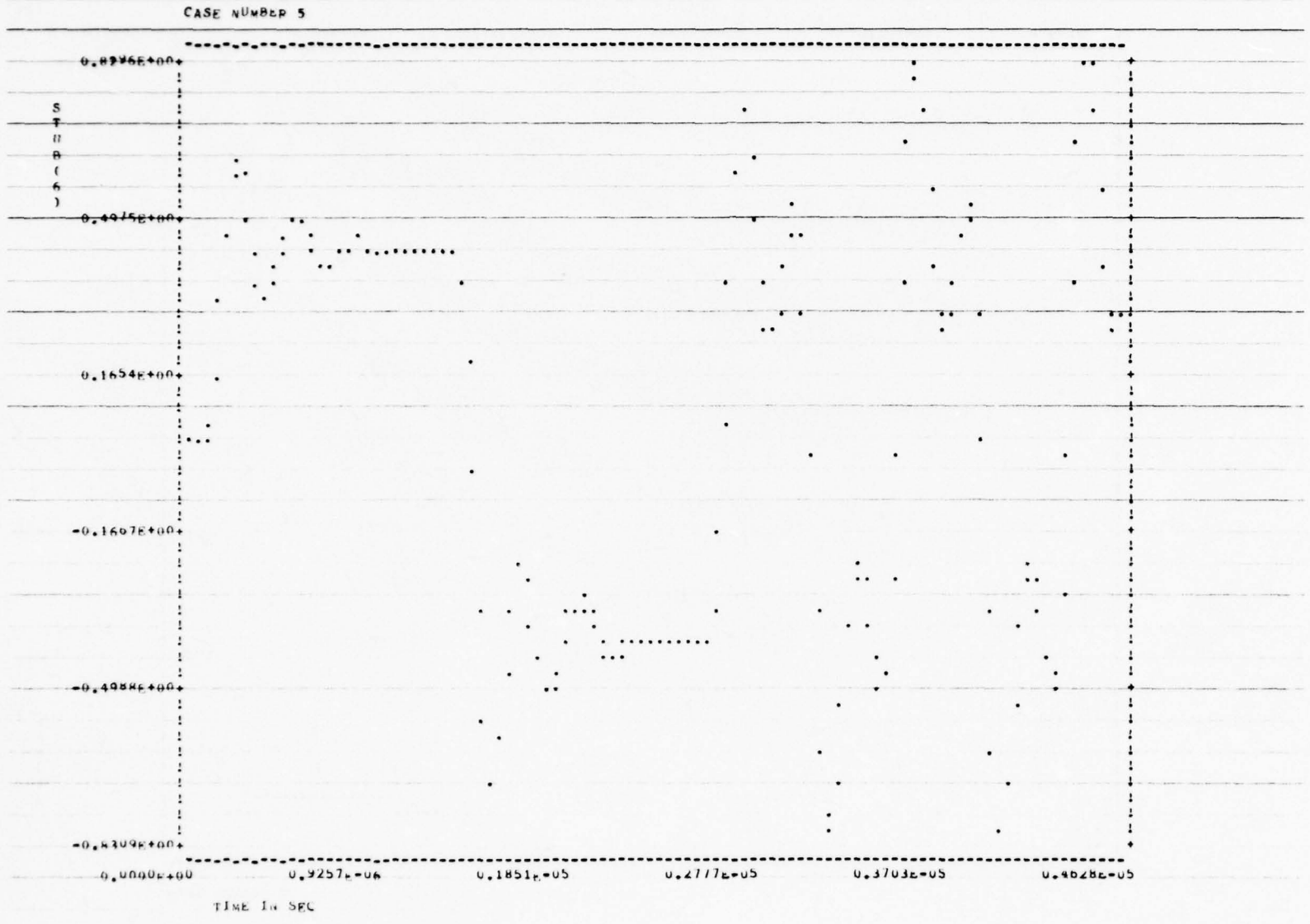

CASE NUMBER 5
0.9854E+00
0.5910E+00
0.1956E+00
-0.1998E+00
-0.5952E+00
-0.9906E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

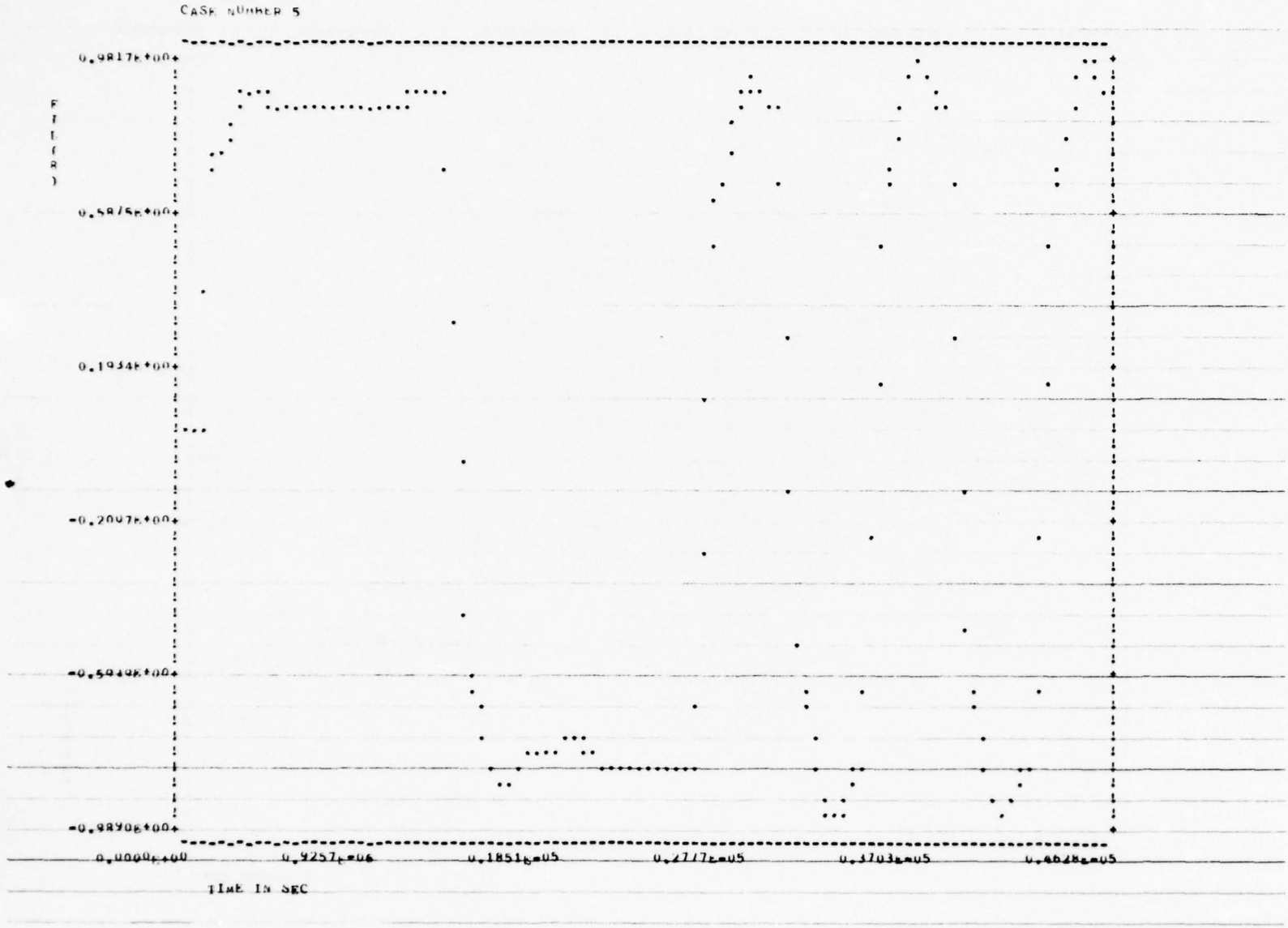
THE MINIMUM-MAXIMUM VALUES FOR THE VARIABLES IN CURVE 6 ARE EQUAL

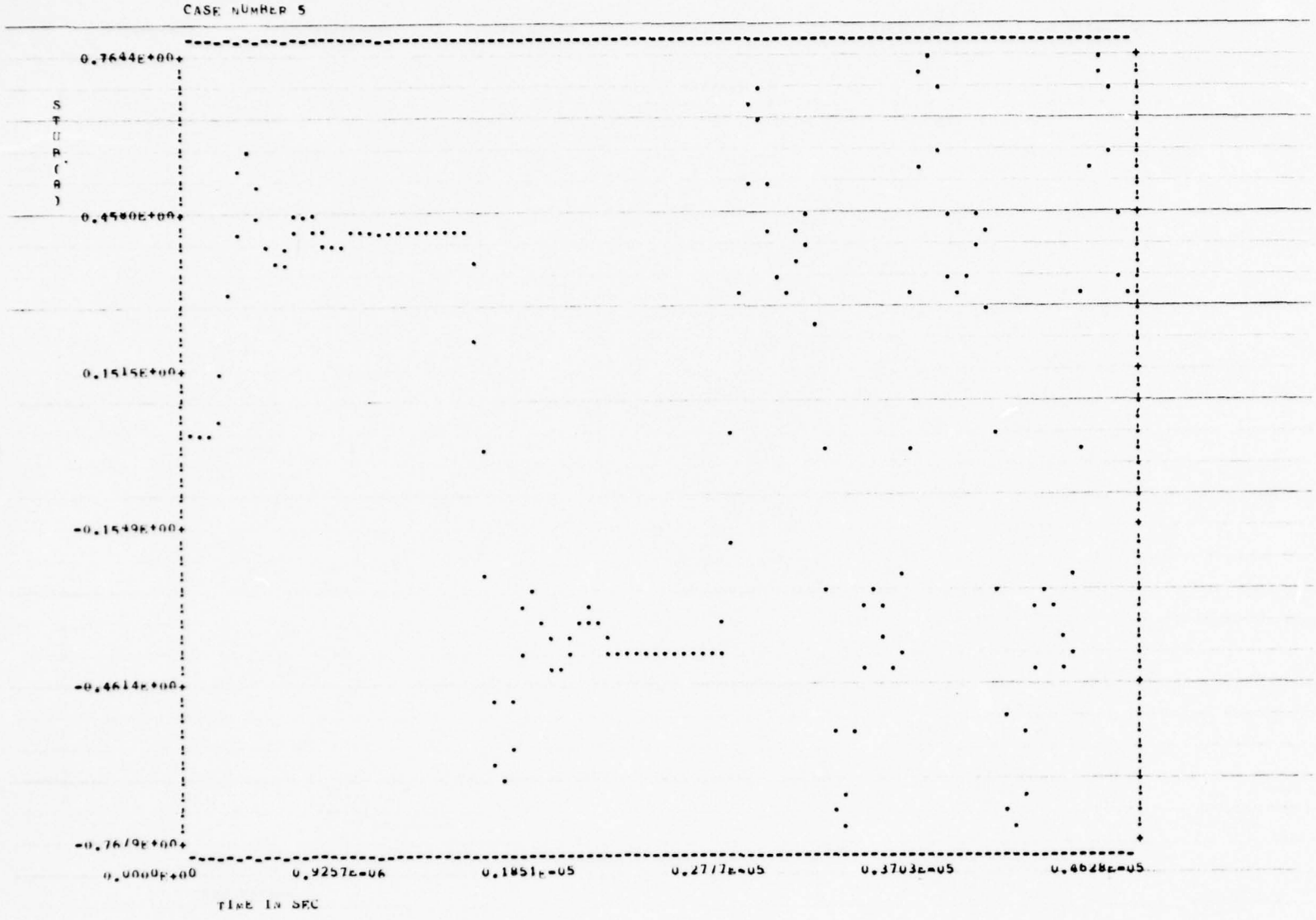

CASE NUMBER 5
F I L (4)
0.97+0E+00+
0.5834E+00+
0.1947E+00+
-0.1960E+00+
-0.5867E+00+
-0.9773E+00+
0.0000E+00
0.9257E-06
0.1851E-05
0.2717E-05
0.3703E-05
0.4628E-05
TIME IN SEC

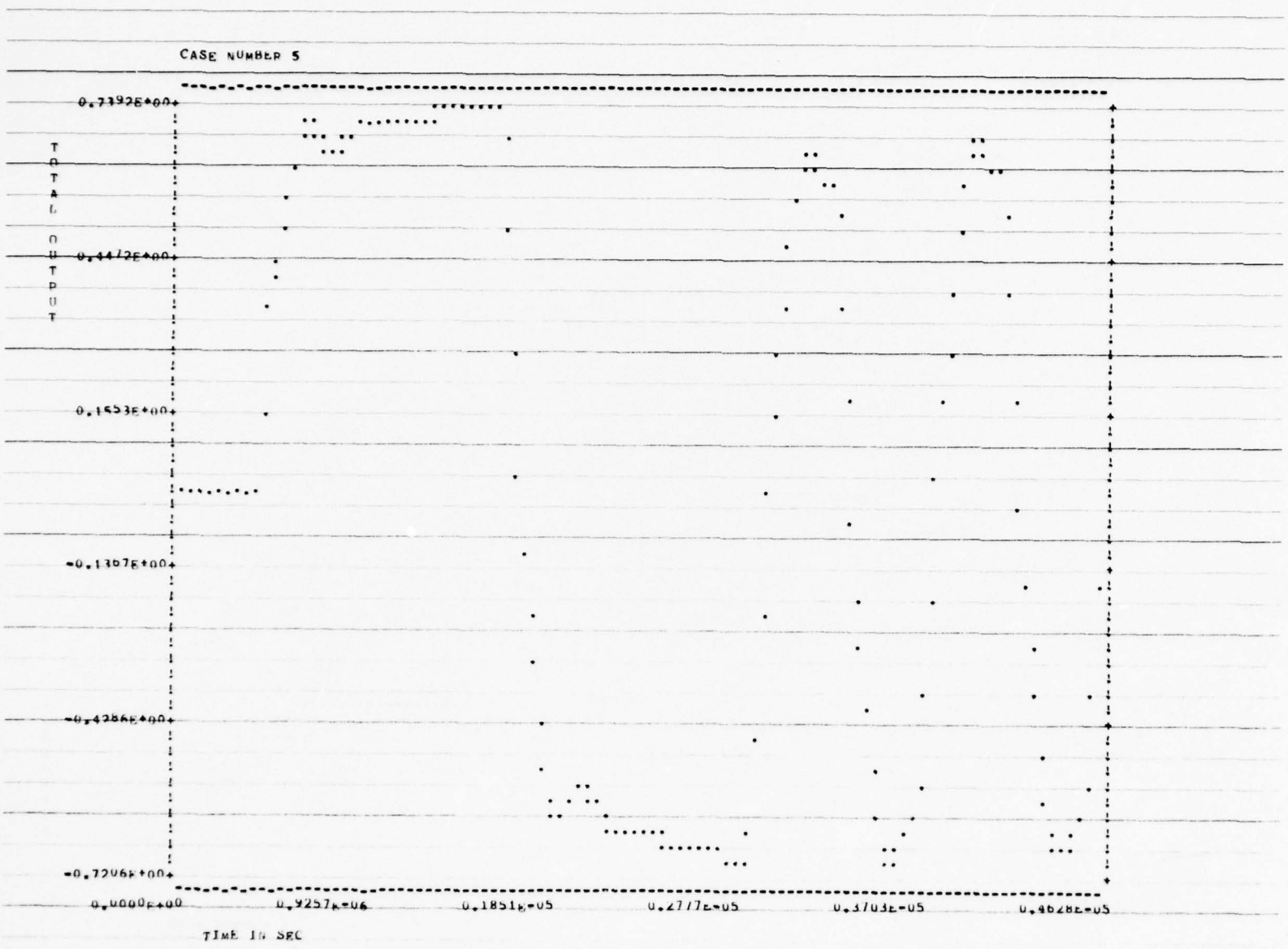

CASE NUMBER 5
0.9137E+00
0.5480E+00
0.1824E+00
-0.1833E+00
-0.5490E+00
-0.9146E+00
SUB(4)
0.0000E+00
0.9257E-04
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

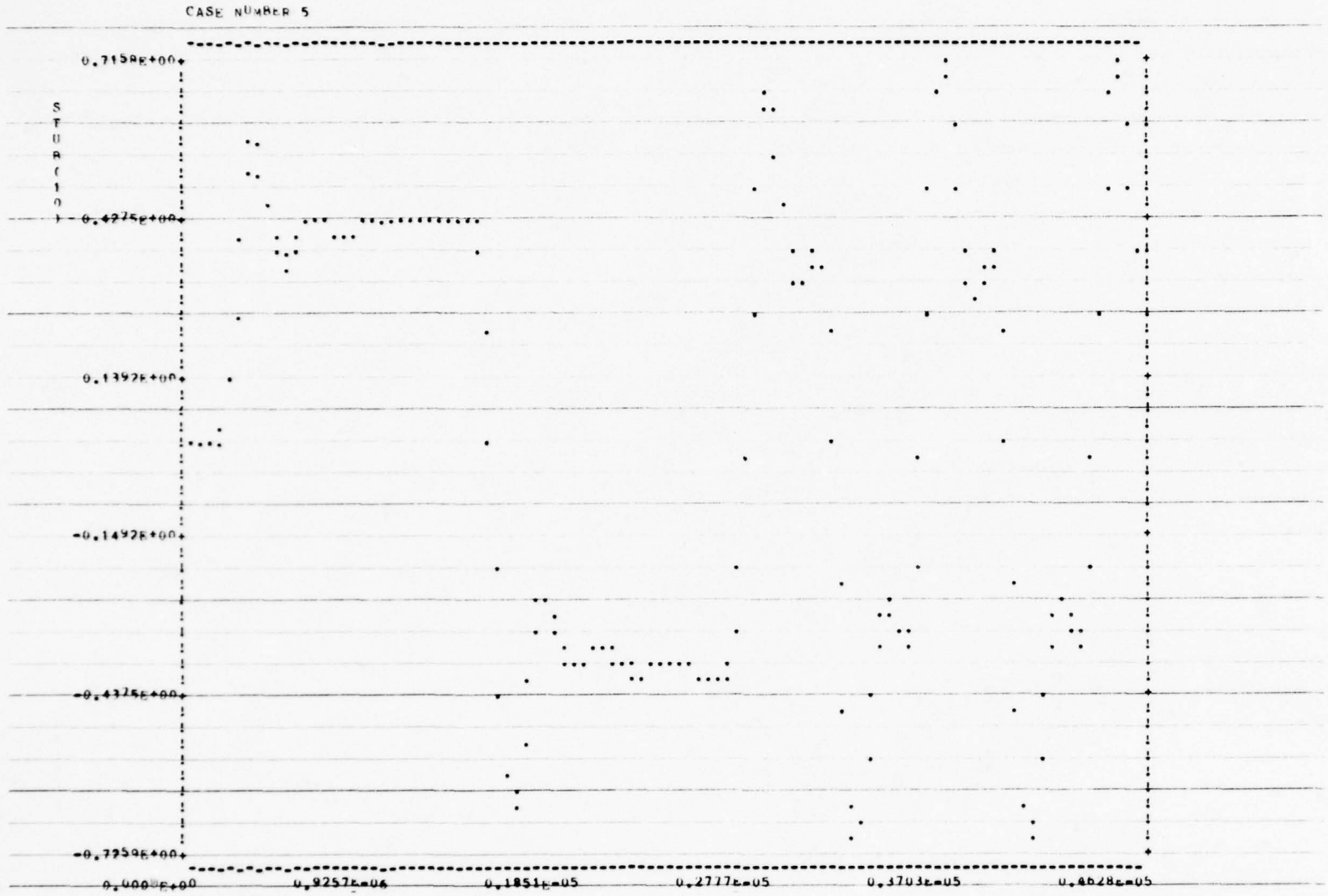

CASE NUMBER 5
0.9742E+00
0.5832E+00
0.1941E+00
-0.1950E+00
-0.5900E+00
-0.9811E+00
F
I
G
S
)
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

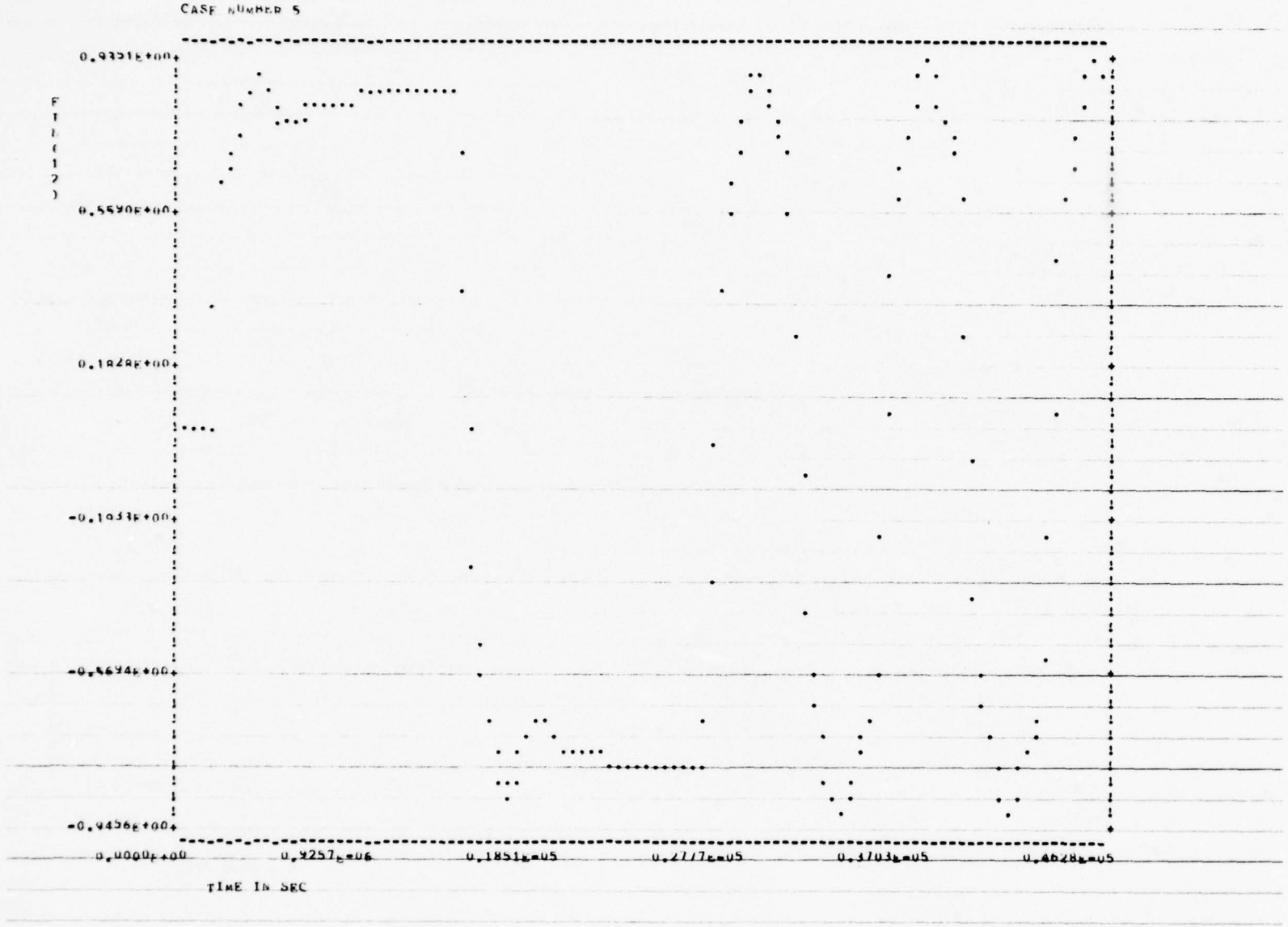

CASE NUMBER 5
STUB(6)
0.1654E+00
-0.1607E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
TIME IN SEC

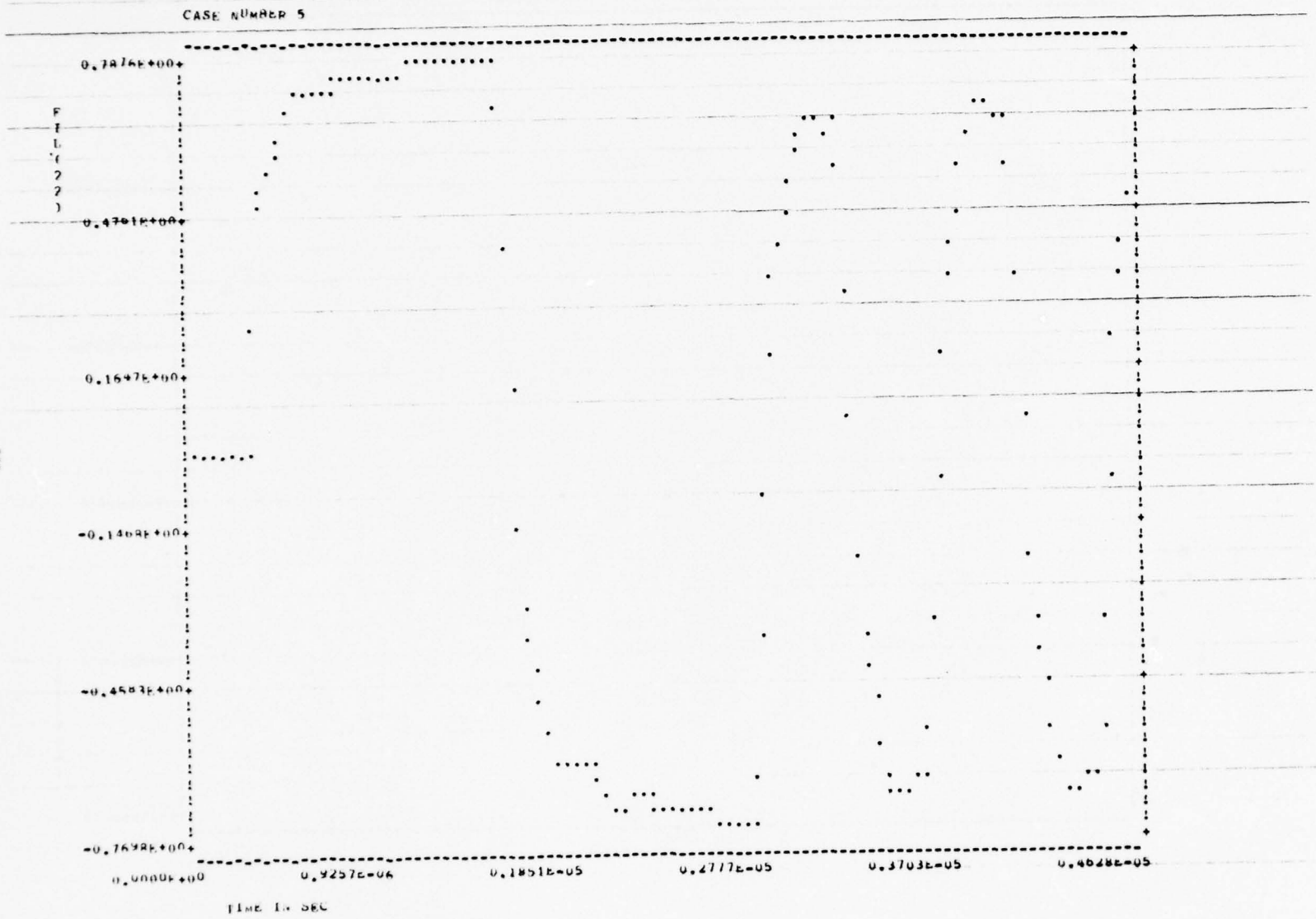

CASE NUMBER 5
0.9817E+00
0.5875E+00
0.1934E+00
-0.2007E+00
-0.5948E+00
-0.9890E+00
FILTER
0.0000E+00
0.9257E+05
0.1851E+05
0.2777E+05
0.3703E+05
0.4628E+05
TIME IN SEC

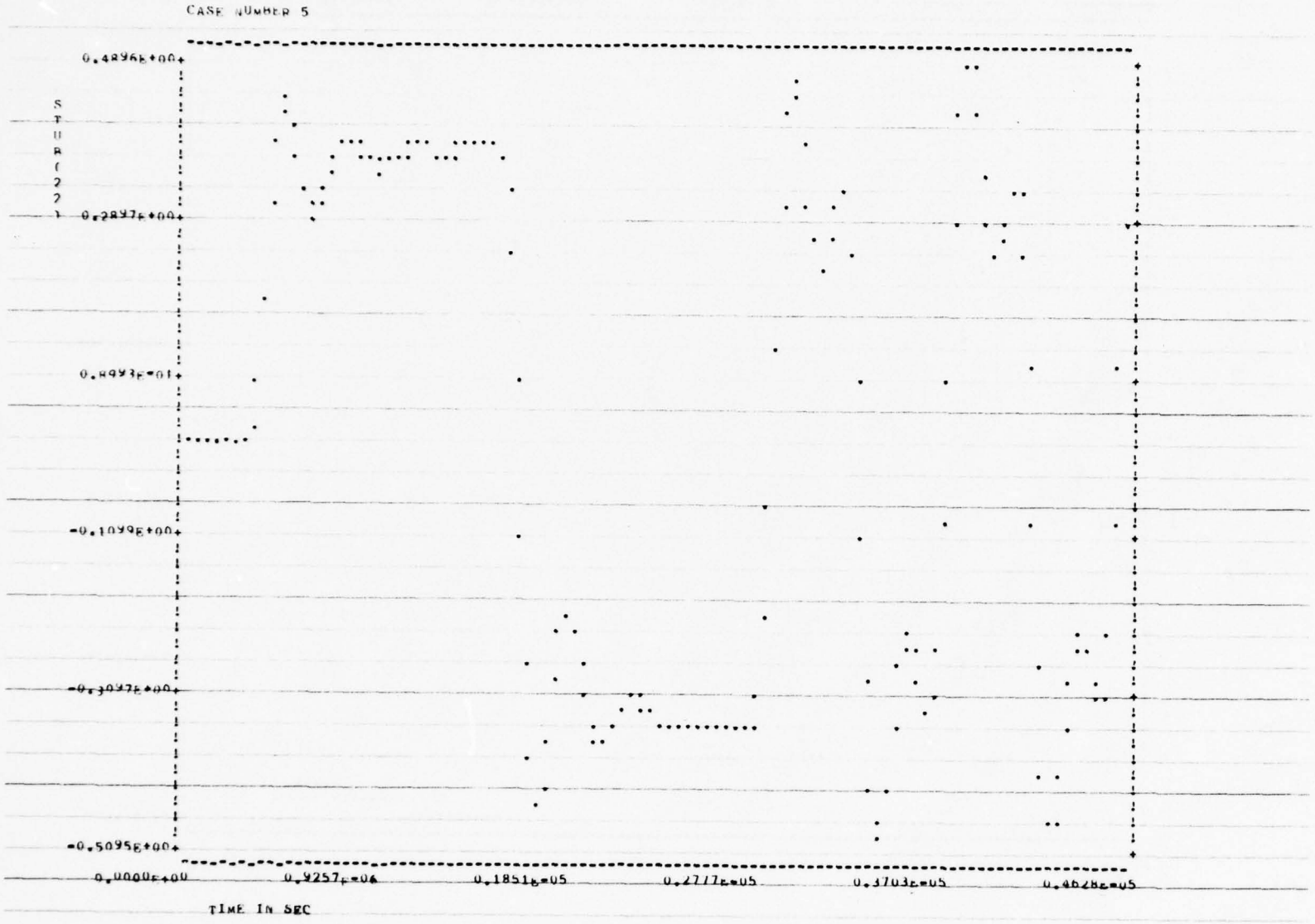

CASE NUMBER 5
0.7644E+00
0.4580E+00
0.1515E+00
-0.1549E+00
-0.4614E+00
-0.7679E+00
S T D R (A)
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

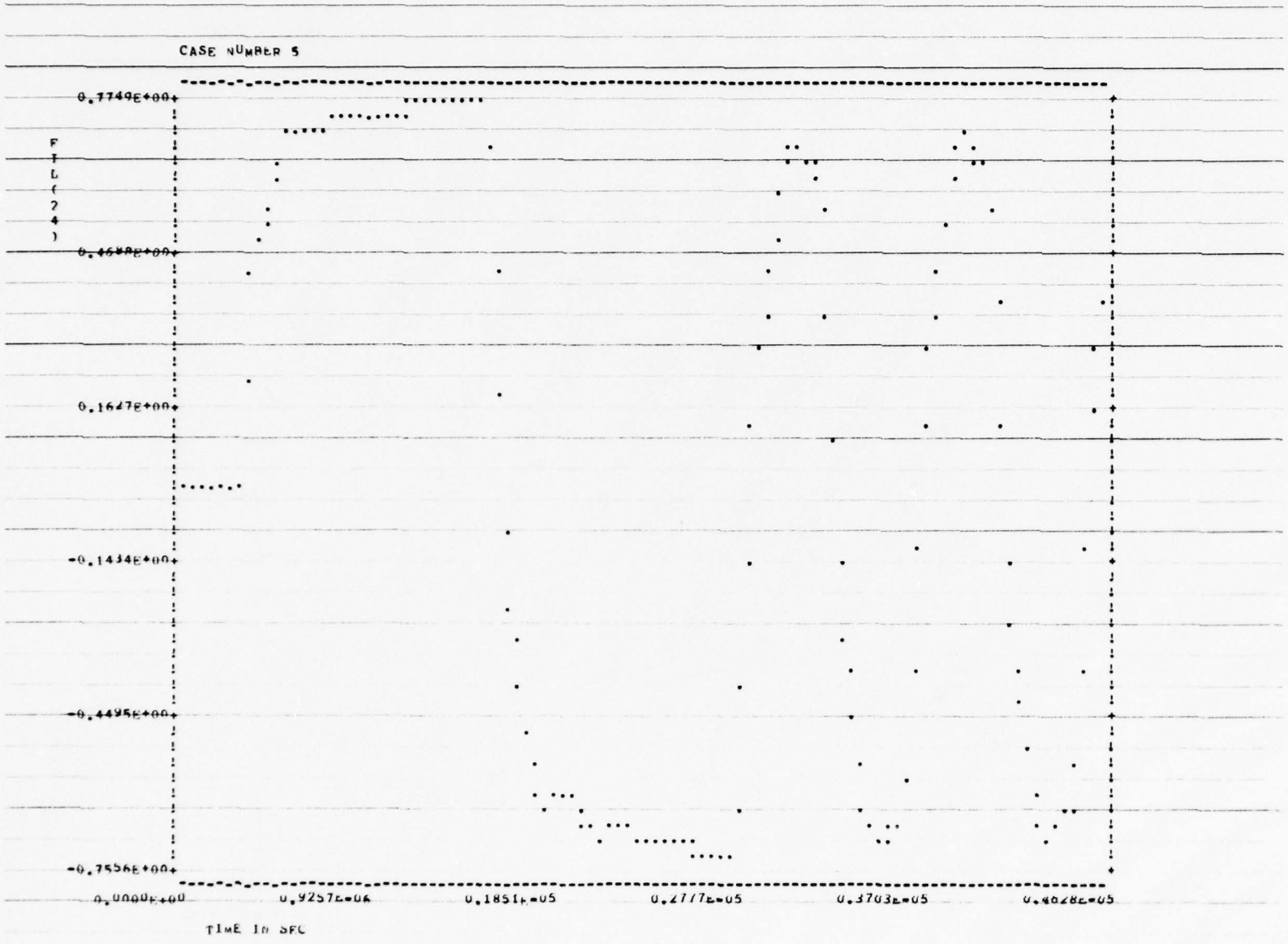

CASE NUMBER 5
0.7392E+00
TOTAL OUTPUT
0.4472E+00
0.1553E+00
-0.1307E+00
-0.4286E+00
-0.7266E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC


CASE NUMBER 5
0.7158E+00
0.4275E+00
0.1392E+00
-0.1492E+00
-0.4375E+00
-0.7259E+00
STUB(101)
0.000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC


CASE NUMBER 5
F I E (1 2)
0.9331E+00
0.5590E+00
0.1848E+00
-0.1953E+00
-0.5694E+00
-0.9436E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC


CASE NUMBER 5
0.7876E+00
0.4701E+00
0.1647E+00
-0.1468E+00
-0.4583E+00
-0.7698E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC


CASE NUMBER 5
STRAIN
0.4896E+00
0.2897E+00
0.8993E-01
-0.1099E+00
-0.3097E+00
-0.5095E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC


CASE NUMBER 5
F
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L
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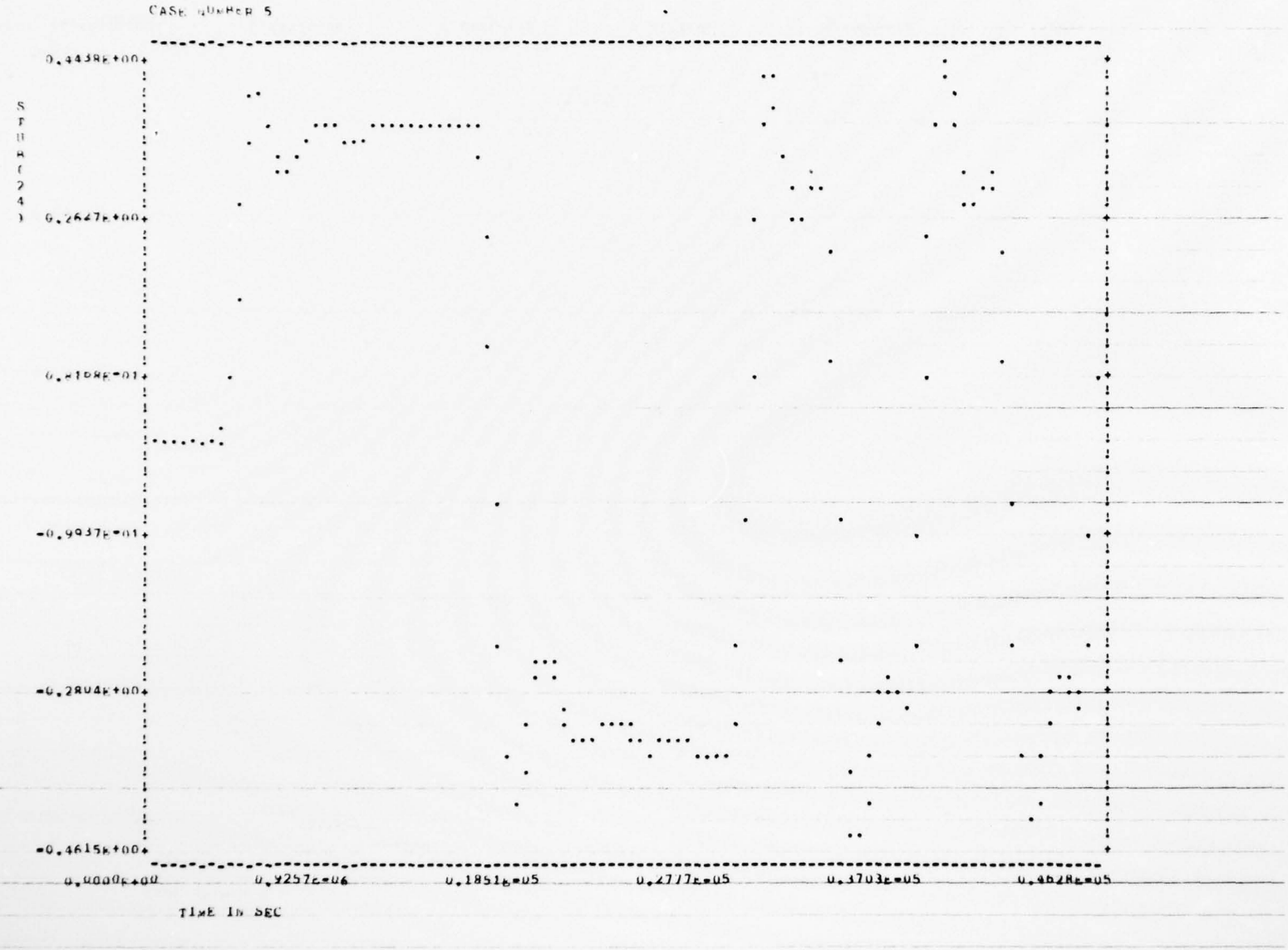
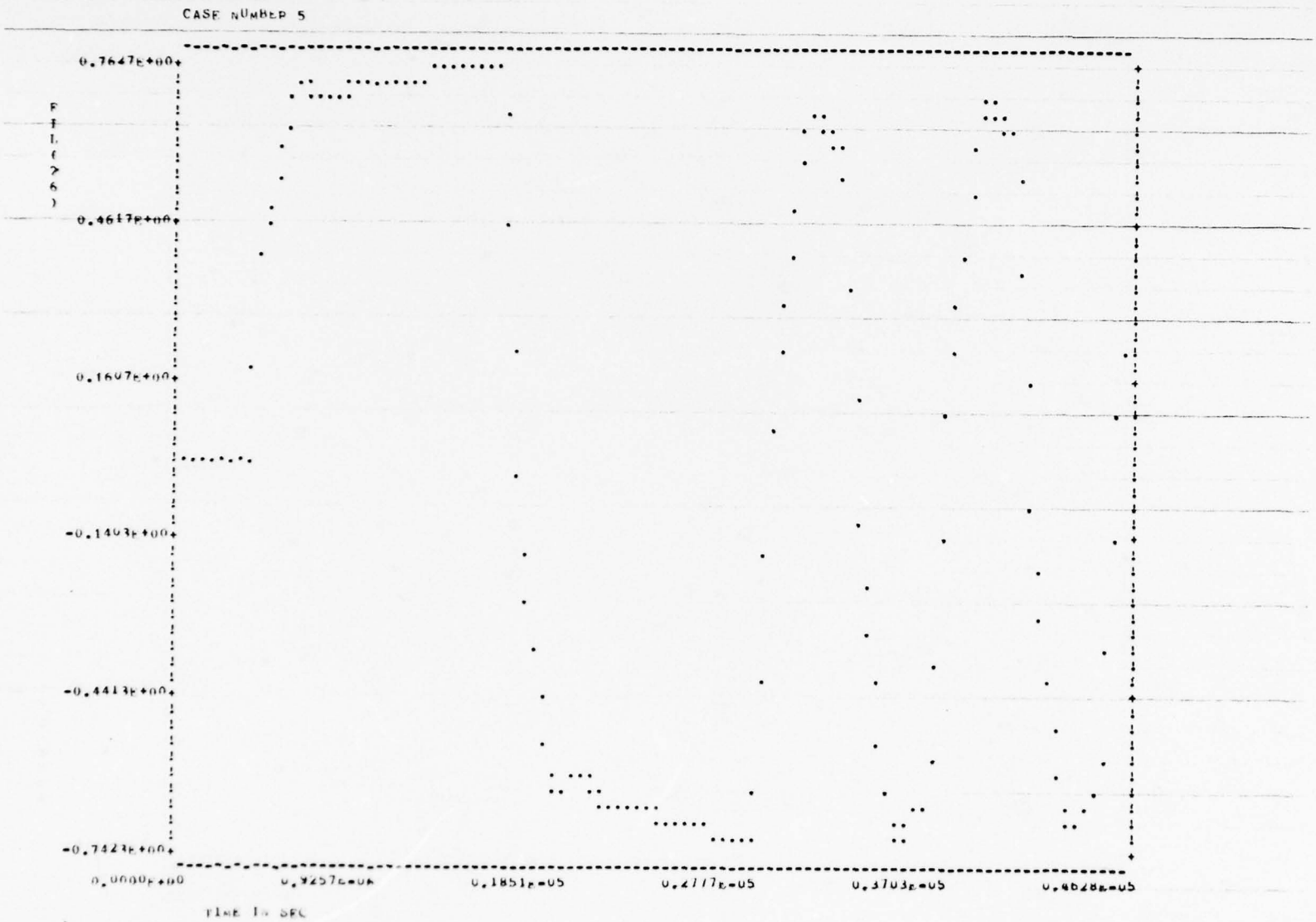
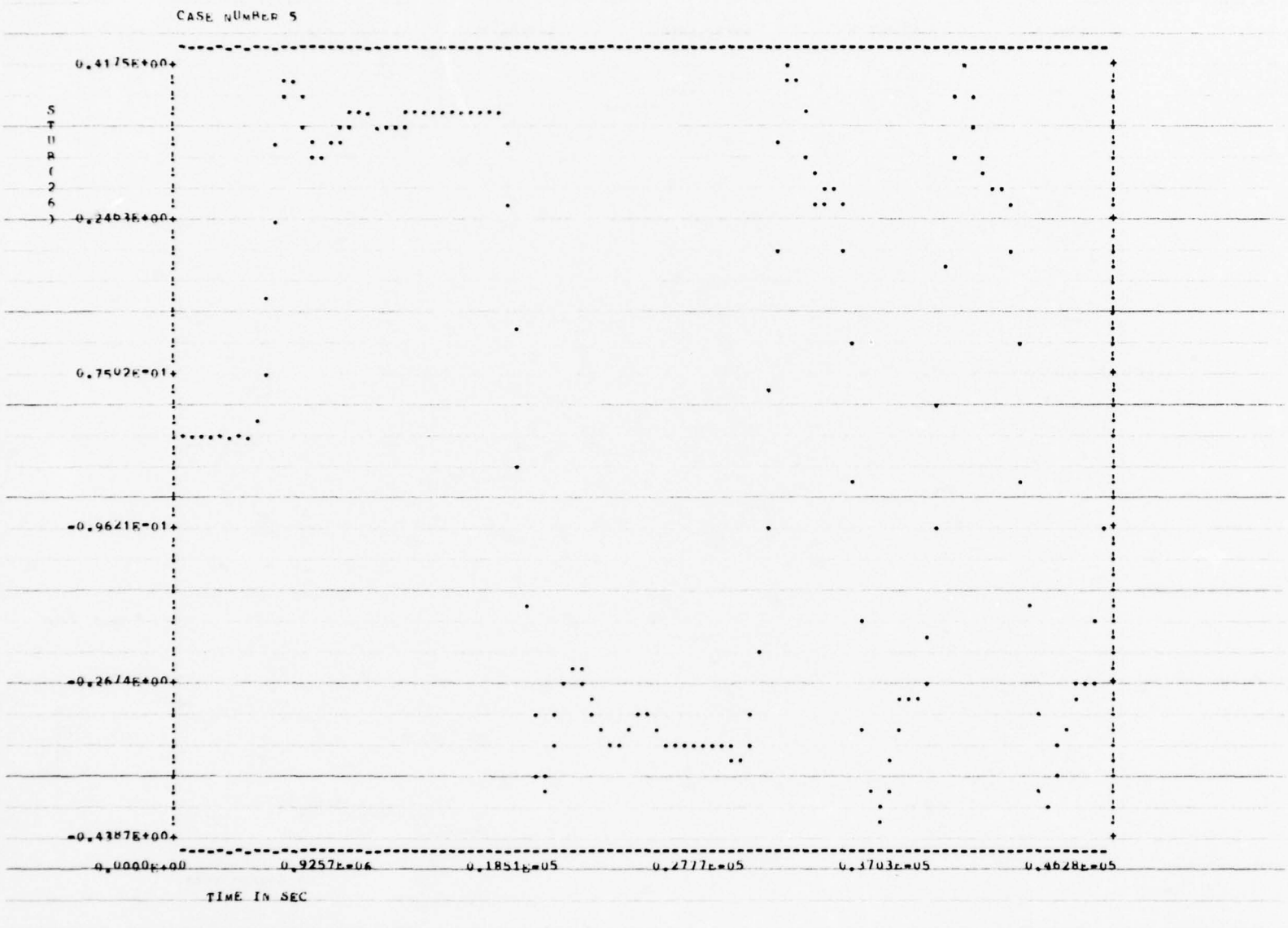
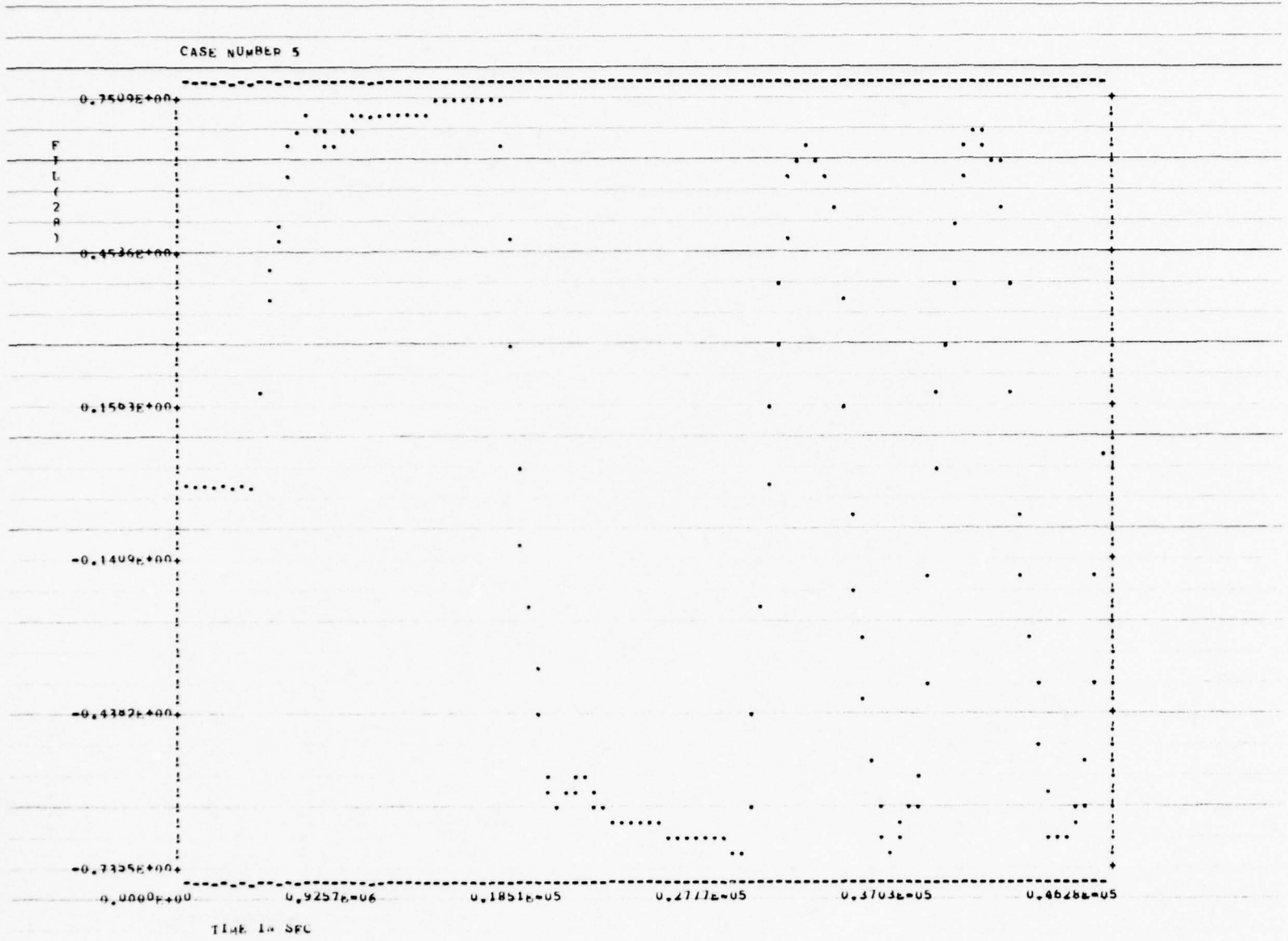
)
0.1749E+00
0.1647E+00
-0.1434E+00
-0.4495E+00
-0.7556E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
TIME IN SEC


CASE NUMBER 5
0.4438E+00
0.2647E+00
0.4188E-01
-0.9937E-01
-0.2804E+00
-0.4615E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC


CASE NUMBER 5
0.7647E+00
0.4617E+00
0.1607E+00
-0.1403E+00
-0.4413E+00
-0.7423E+00
0.0000E+00
0.9257E+04
0.1851E+05
0.2777E+05
0.3703E+05
0.4628E+05
TIME IN SEC


CASE NUMBER 5
0.4175E+00
0.2403E+00
0.7502E-01
-0.9621E-01
-0.2674E+00
-0.4387E+00
STUB(26)
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC


CASE NUMBER 5
0.7509E+00
0.4536E+00
0.1593E+00
-0.1409E+00
-0.4382E+00
-0.7355E+00
F
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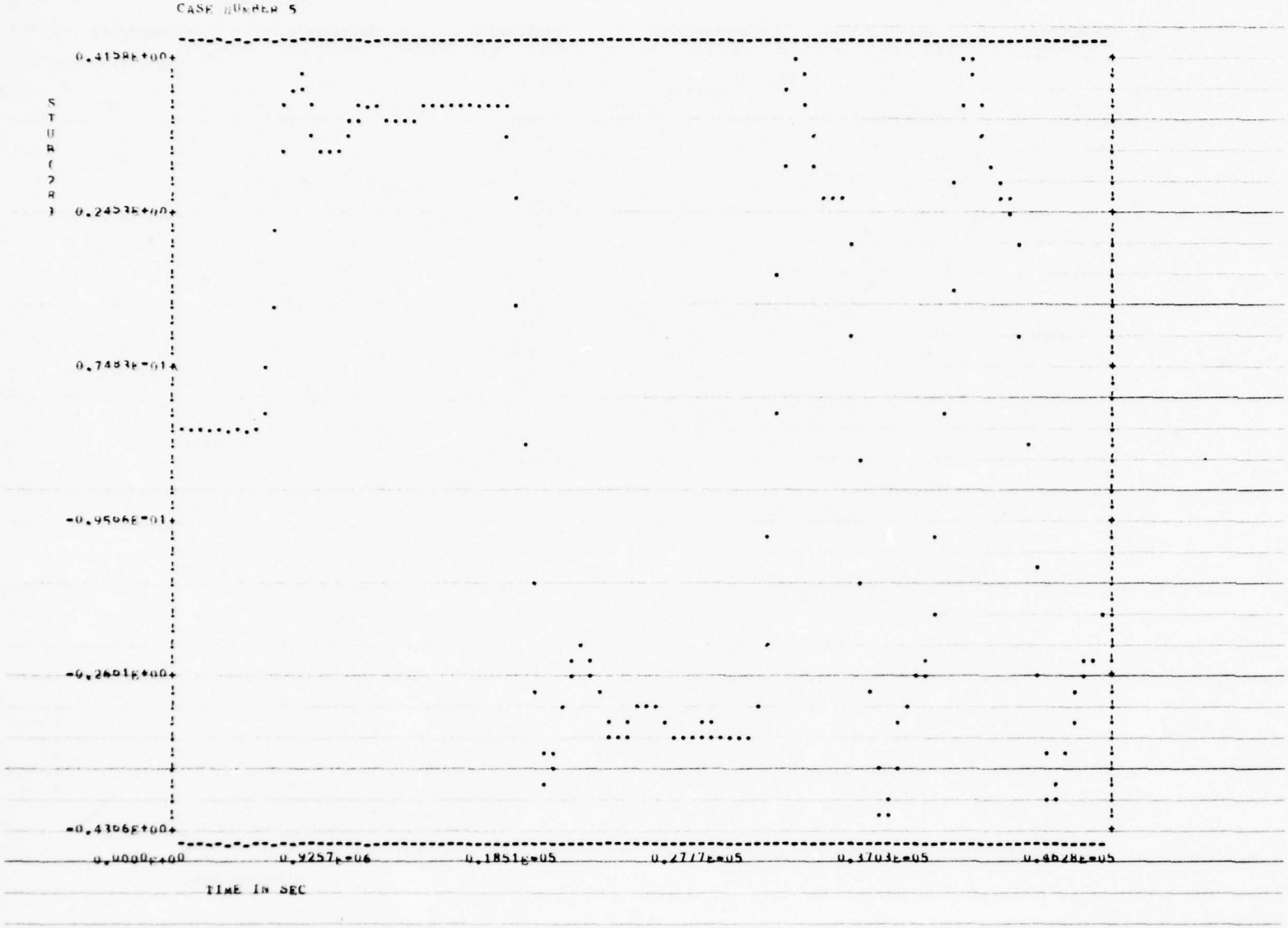
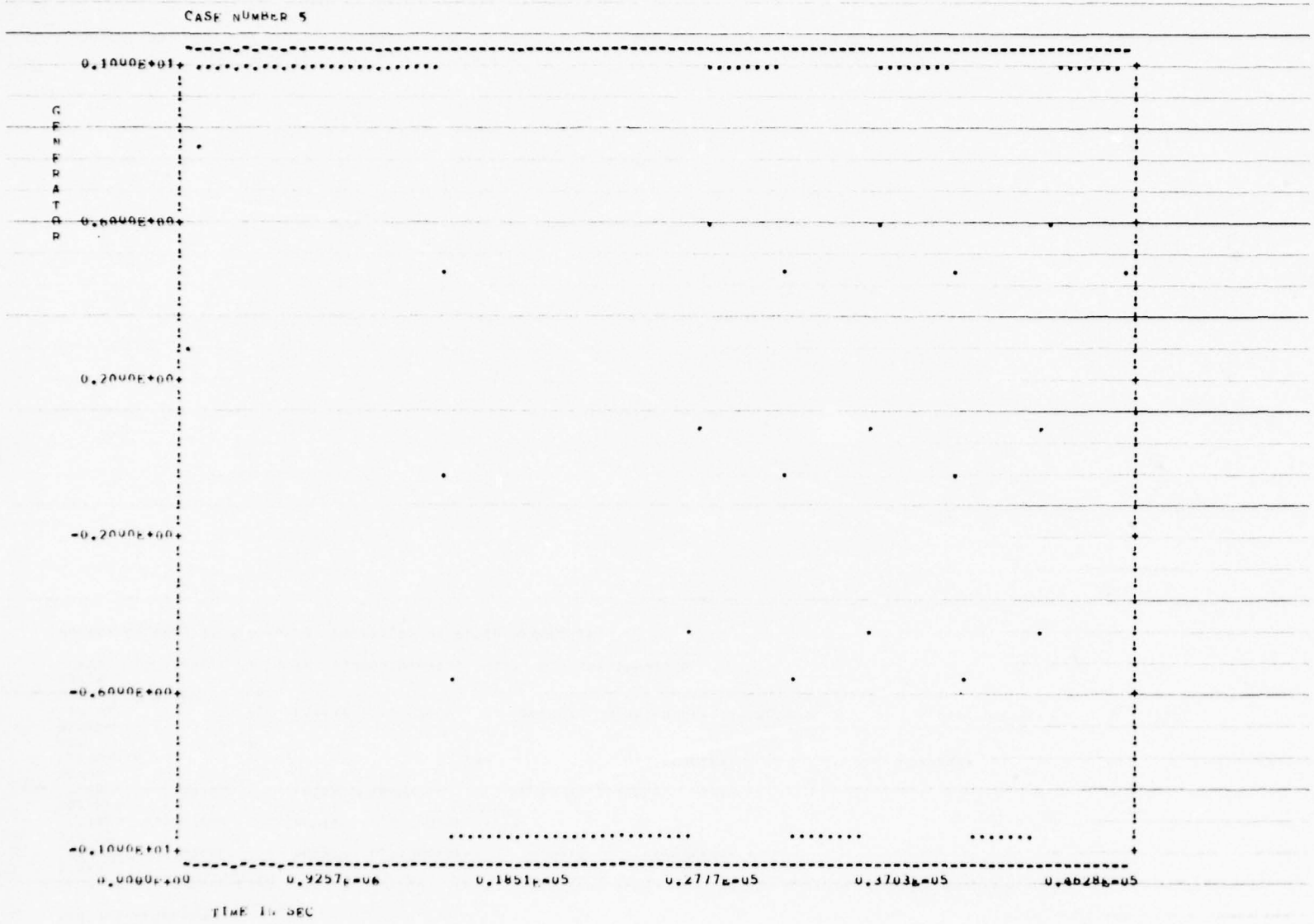
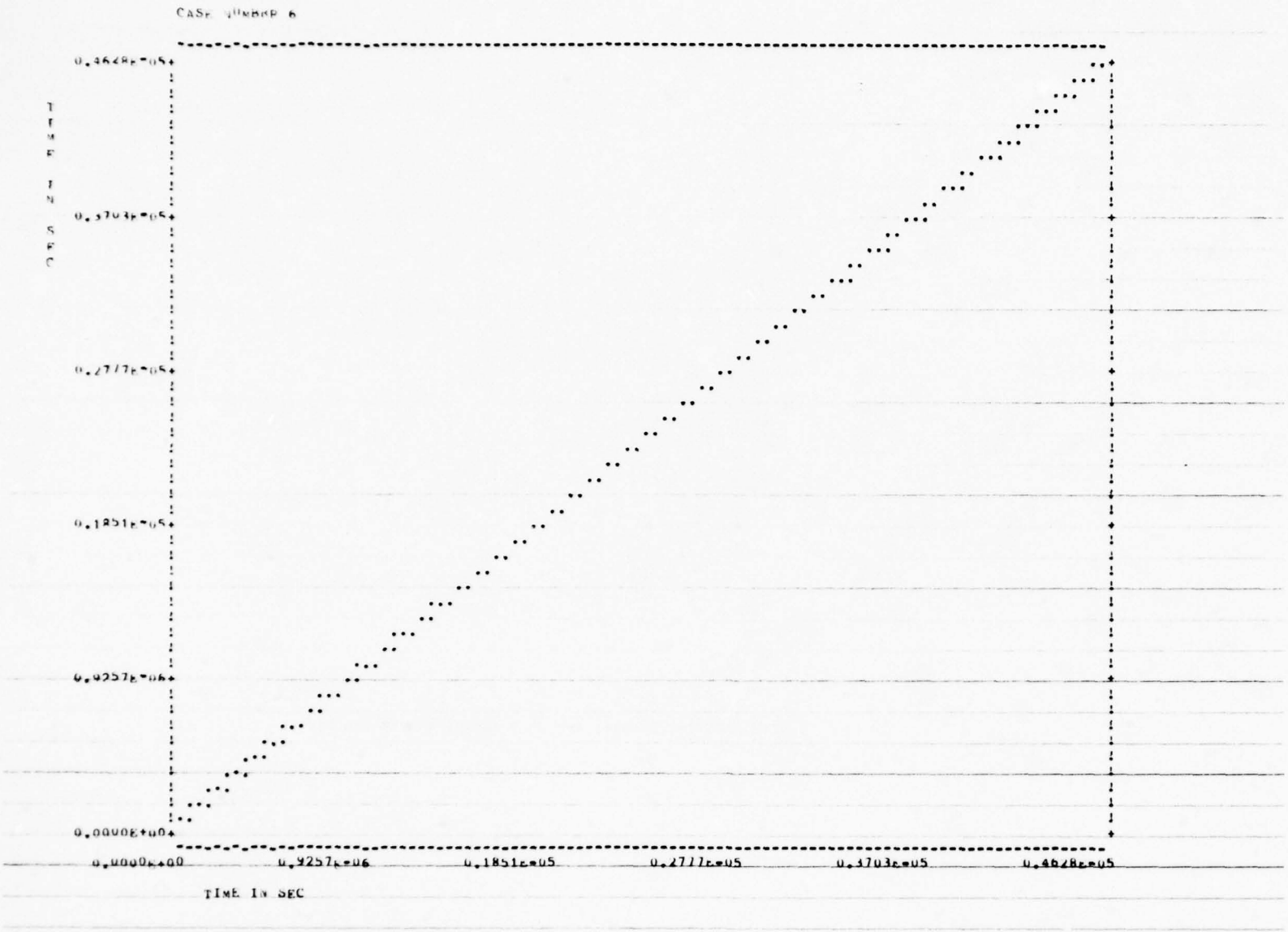
)
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

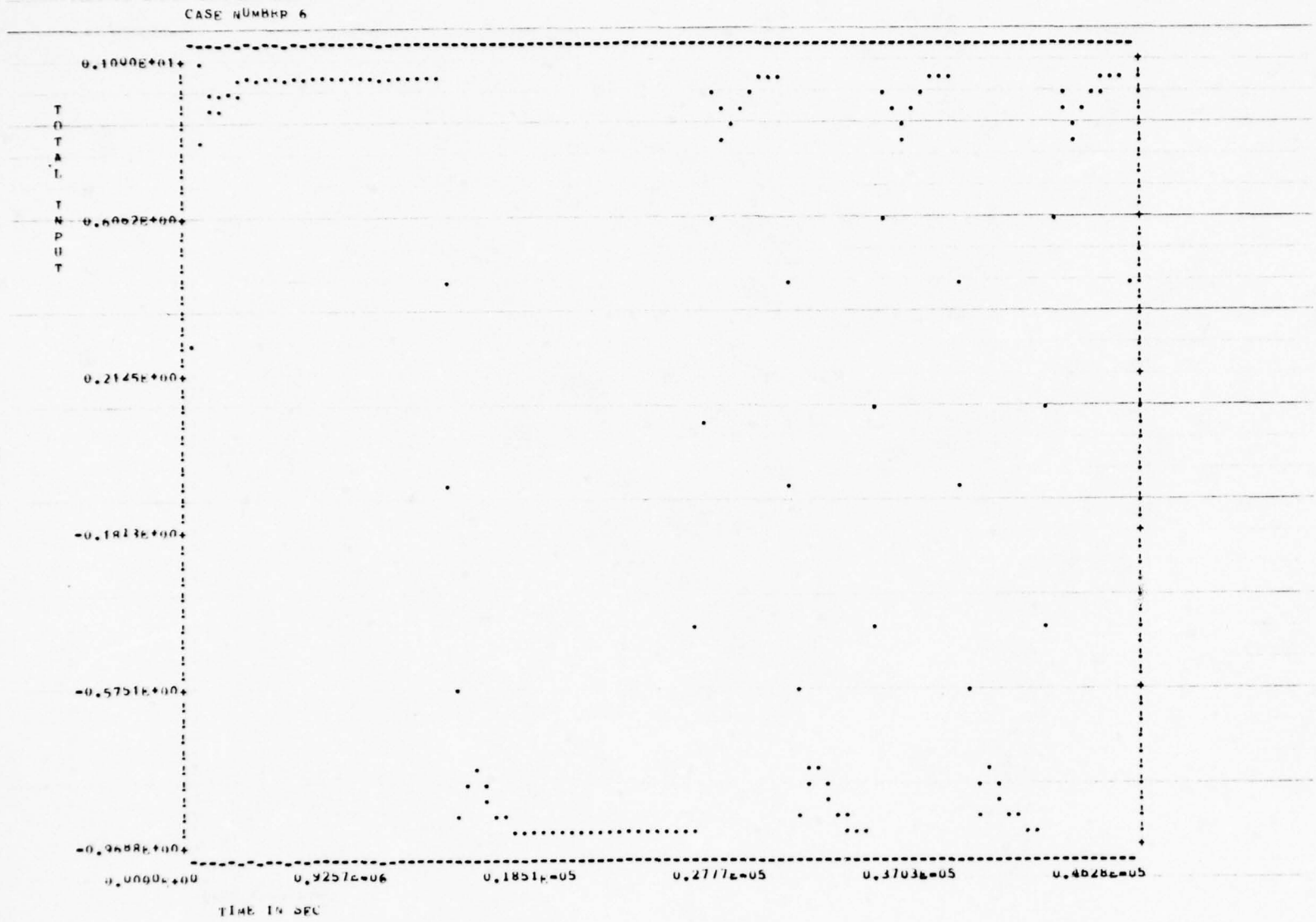

CASE NUMBER 5
STUB(2,3)
0.4158E+00
0.2453E+00
0.7483E-01
-0.9506E-01
-0.2601E+00
-0.4306E+00
0.0000E+00
0.9257E+06
0.1851E+06
0.2777E+06
0.3703E+06
0.4628E+06
TIME IN SEC

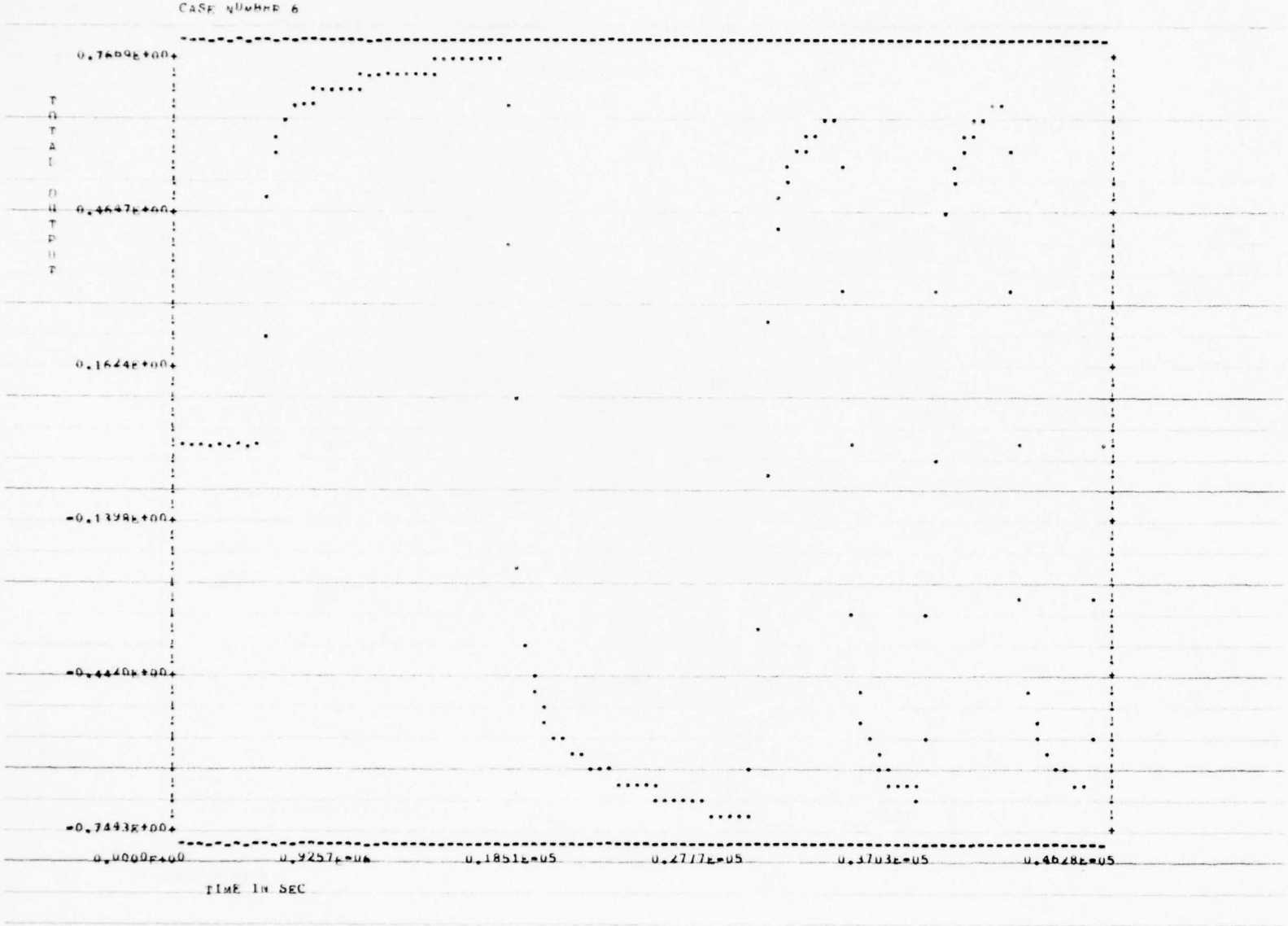

CASE NUMBER 5
0.1000E+01
0.6000E+00
0.2000E+00
-0.2000E+00
-0.6000E+00
-0.1000E+01
G FORCE
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

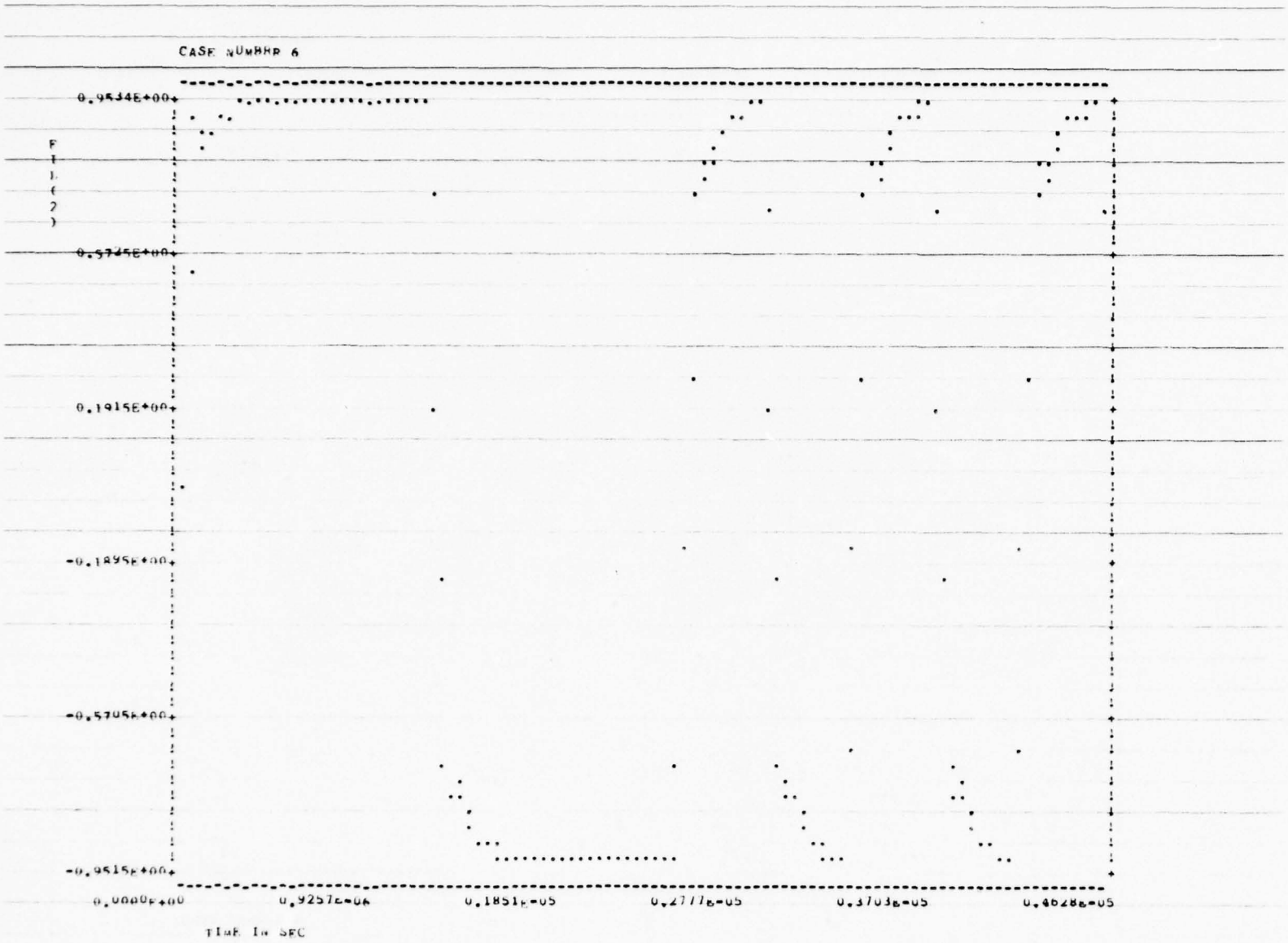
```
NEW JOB BEGINNING

$SCT DATA .0000001330  350.0   112.0   10.0    0.89200  0.93570  0.00850  0.00000  0.00000 68.00000  2200.000
$TRAN1
 GAIN1=  0.5885100    , WNSD1=  0.4500000E+17,  FWDZ=1=  0.9000000E+09, $
$TRAN2
 GAIN2=  0.2617000    , RDDI2=  0.2000000E+08, $
$GENXFR
 GAIN3=  0.3000000    , POLE=   8000000.    ,  REF1= -0.1530000    , $
$STUB
 ISTUB=2*              0,              1, 28*              0,  NPSKIP=              2,  LSTUB=2*              0,              20,
28*              0, $
$GENER
 IGEN=                0,  GENMAX=   1.000000    ,  ISLOPE=  0.5000000E-07,  NCC1N=             94,  NCCF=             32,
 ZG=   88.00000    , $
$SKIN
 GI1=  0.9730000    ,  GI2=  0.7900000E-02,  GI3=  0.6085800E-02, $

PLOTER CALLED. 24 VARIABLES SPECIFIED. 24 PLOTS REQUESTED.
```

DATA BUS SIMULATION OF A 68 OHM TWISTED SHIELDED PAIR


CASE NUMBER 6
0.4628E+05
0.3703E+05
0.2777E+05
0.1851E+05
0.9257E+04
0.0000E+00
TIME IN SEC
0.0000E+00
0.9257E+06
0.1851E+05
0.2777E+05
0.3703E+05
0.4628E+05
TIME IN SEC


CASE NUMBER 6
0.1000E+01
TOTAL INPUT
0.2145E+00
-0.1813E+00
-0.5751E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
TIME IN SEC


CASE NUMBER 6
0.7689E+00
0.4647E+00
0.1624E+00
-0.1398E+00
-0.4440E+00
-0.7483E+00
TOTAL OUTPUT
0.0000E+00
0.9257E+04
0.1851E+05
0.2777E+05
0.3703E+05
0.4628E+05
TIME IN SEC


CASE NUMBER 6
0.9534E+00
0.5745E+00
0.1915E+00
-0.1895E+00
-0.5705E+00
-0.9515E+00
F
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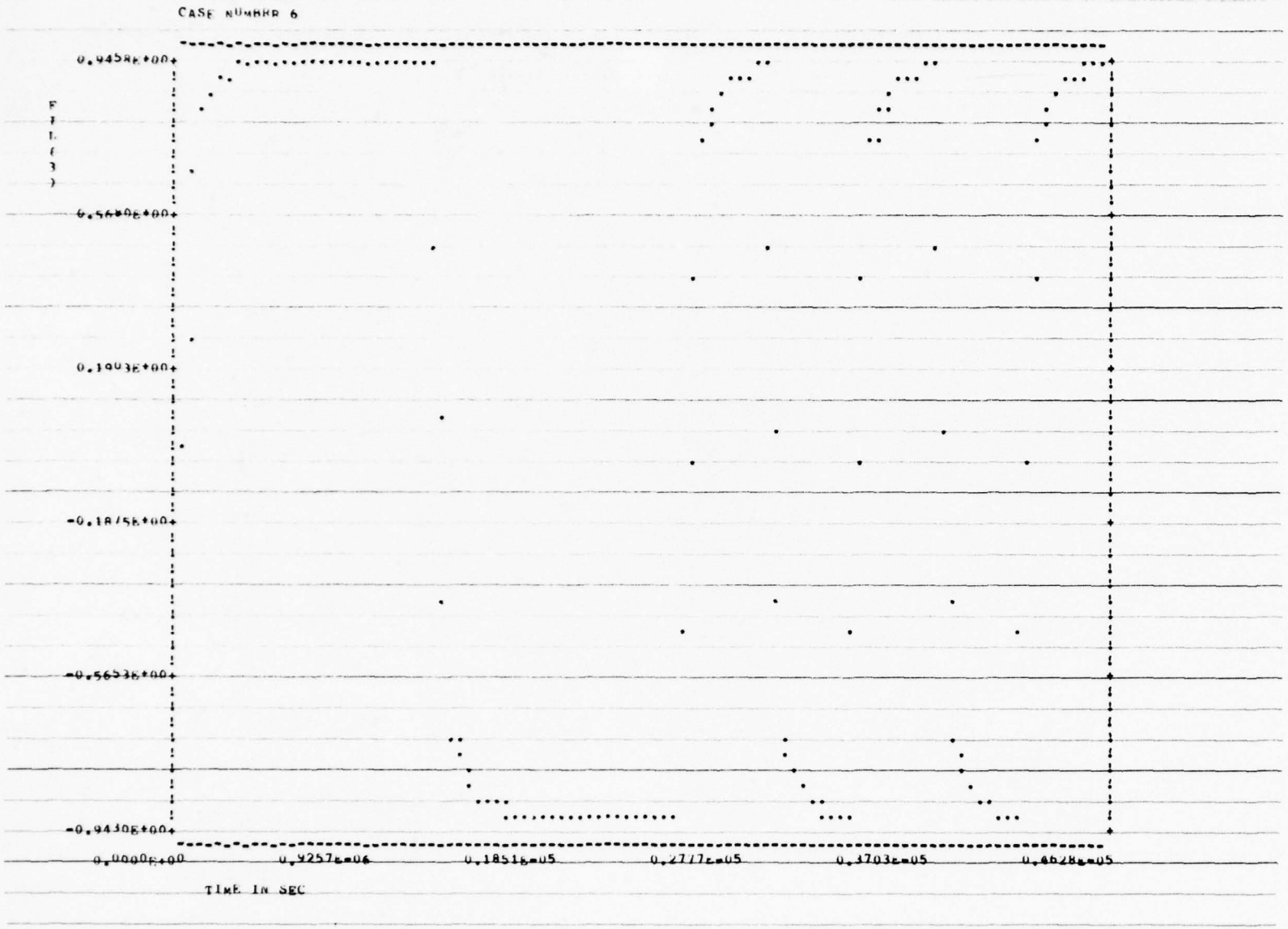
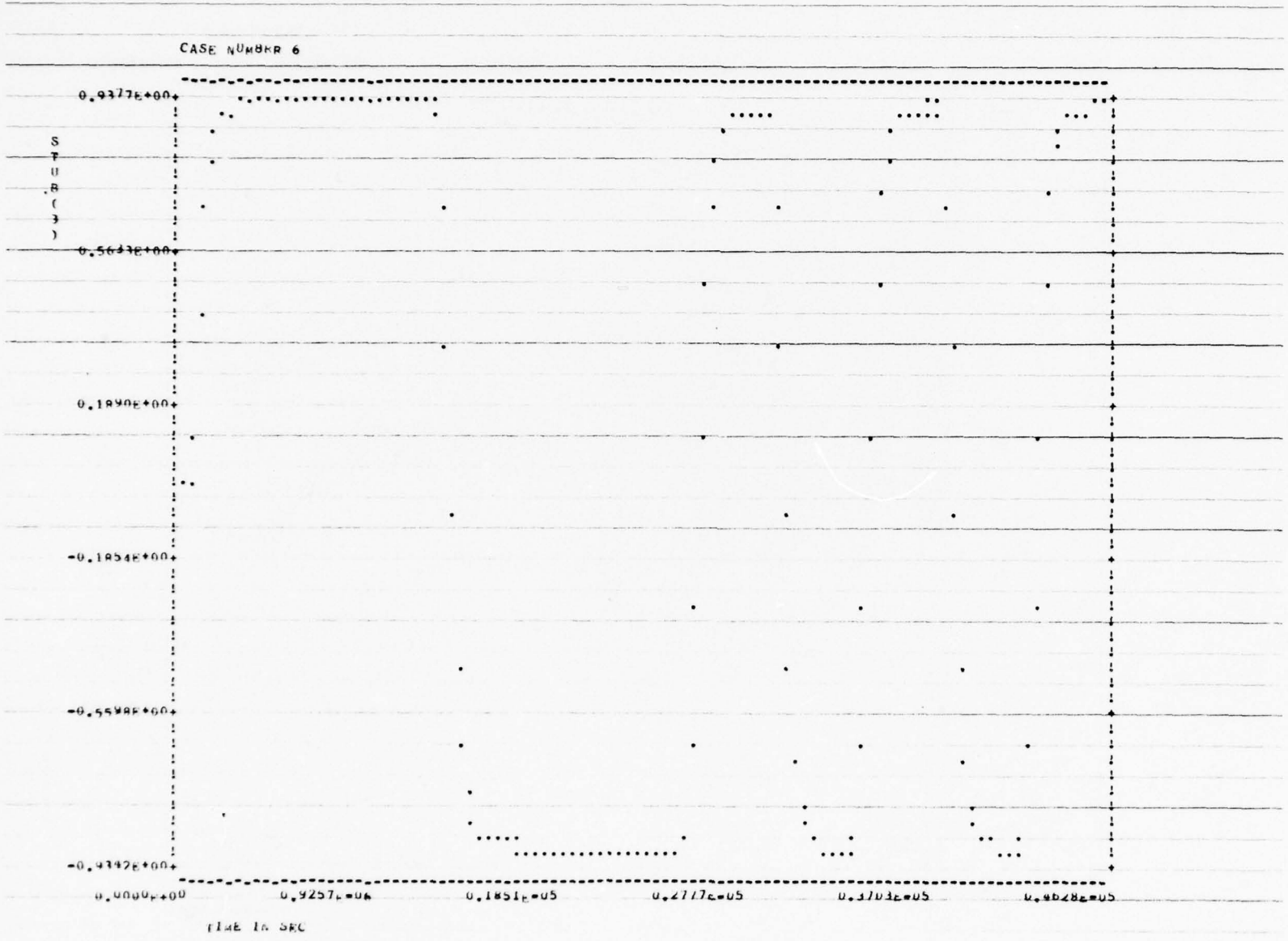
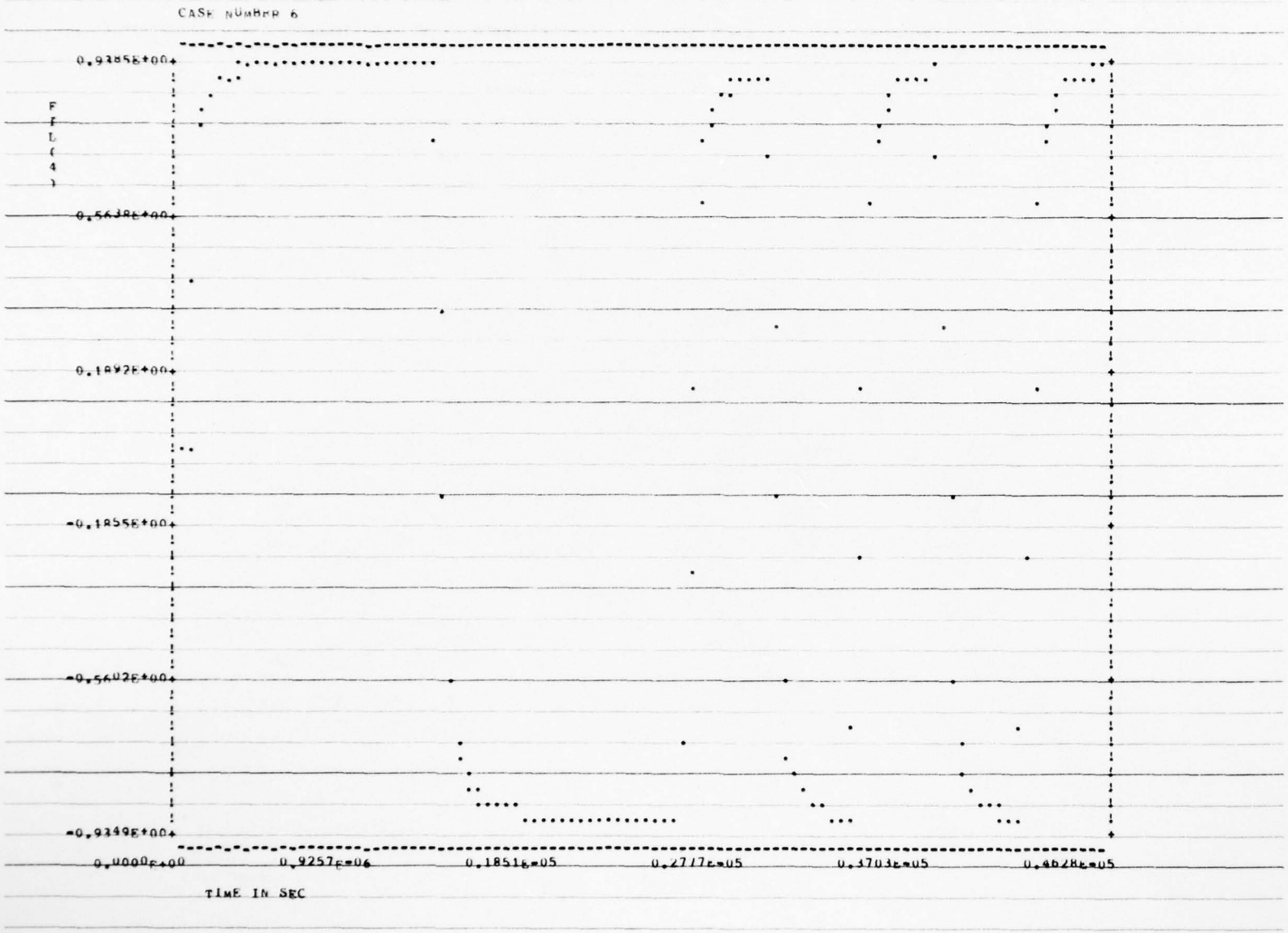
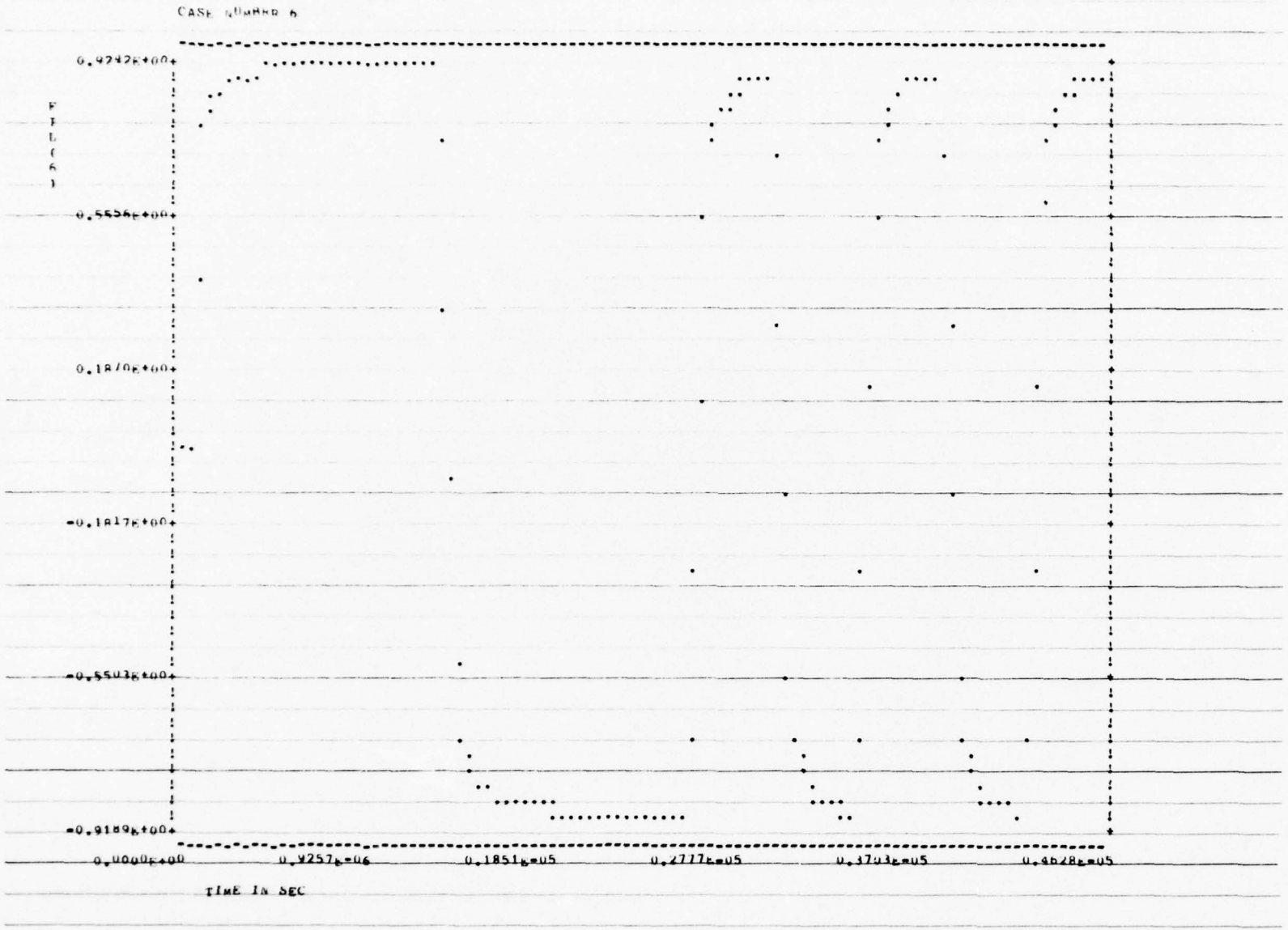
)
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC


CASE NUMBER 6
0.9458E+00
0.1903E+00
-0.1855E+00
-0.5653E+00
-0.9430E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC


CASE NUMBER 6
0.9377E+00
0.5633E+00
0.1890E+00
-0.1854E+00
-0.5598E+00
-0.9342E+00
STUB(3)
0.0000E+00
0.9257E+04
0.1851E+05
0.2777E+05
0.3703E+05
0.4628E+05
TIME IN SEC


CASE NUMBER 6
0.9385E+00
0.5638E+00
0.1892E+00
-0.1855E+00
-0.5602E+00
-0.9349E+00
F(4)
0.0000E+00
0.9257E+05
0.1851E+05
0.2777E+05
0.3703E+05
0.4628E+05
TIME IN SEC

THE MINIMUM-MAXIMUM VALUES FOR THE VARIABLES IN CURVE 8 ARE EQUAL


CASE NUMBER 6
0.9242E+00
0.5556E+00
0.1870E+00
-0.1817E+00
-0.5503E+00
-0.9189E+00
F
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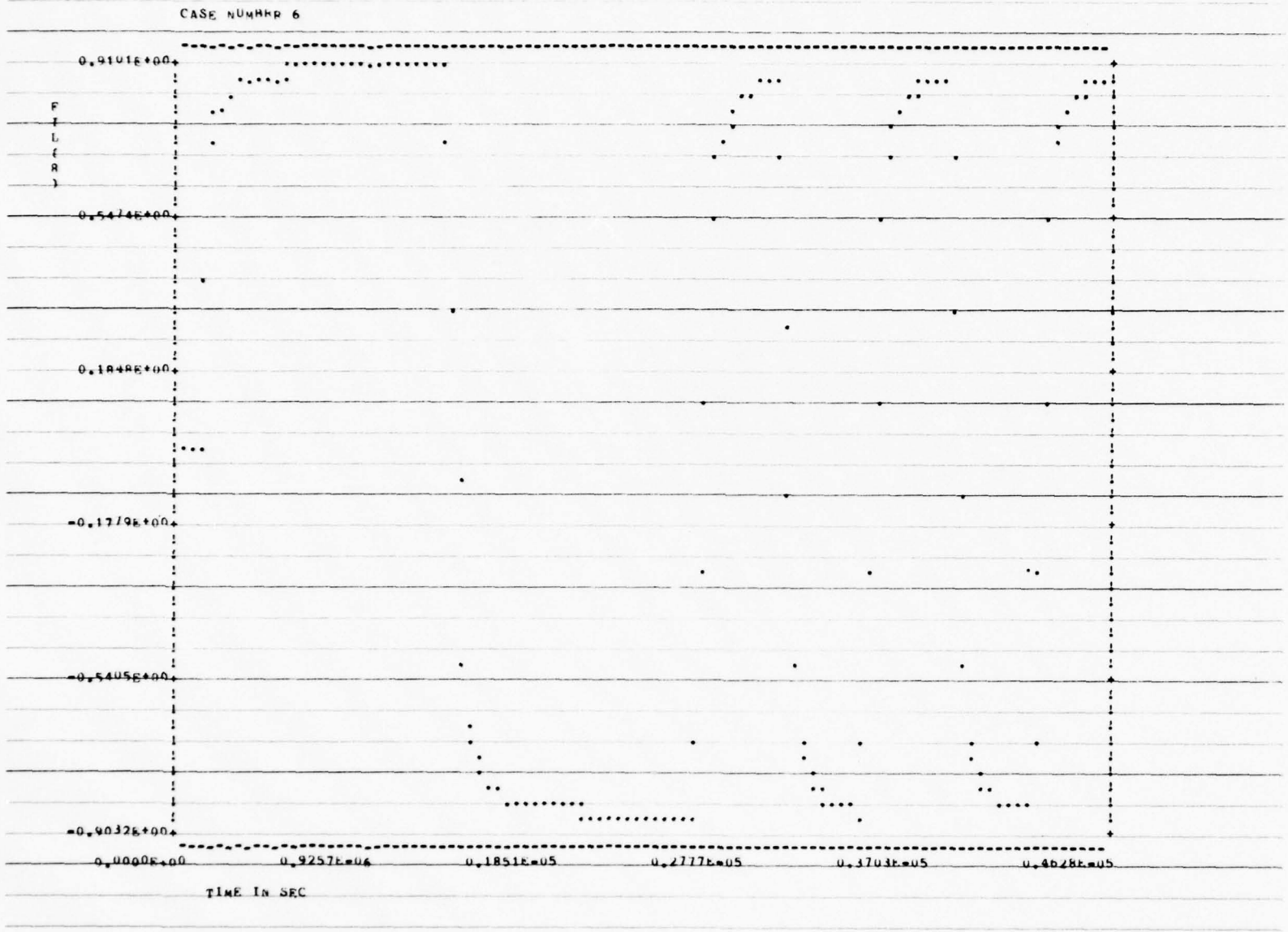
L
G
1
0.0000E+00
0.4257E-06
0.1851E-05
0.2717E-05
0.3703E-05
0.4628E-05
TIME IN SEC

THE MINIMUM-MAXIMUM VALUES FOR THE VARIABLES IN CURVE 10 ARE EQUAL


CASE NUMBER 6
0.9101E+00
0.5474E+00
0.1848E+00
-0.1779E+00
-0.5405E+00
-0.9032E+00
F
I
L
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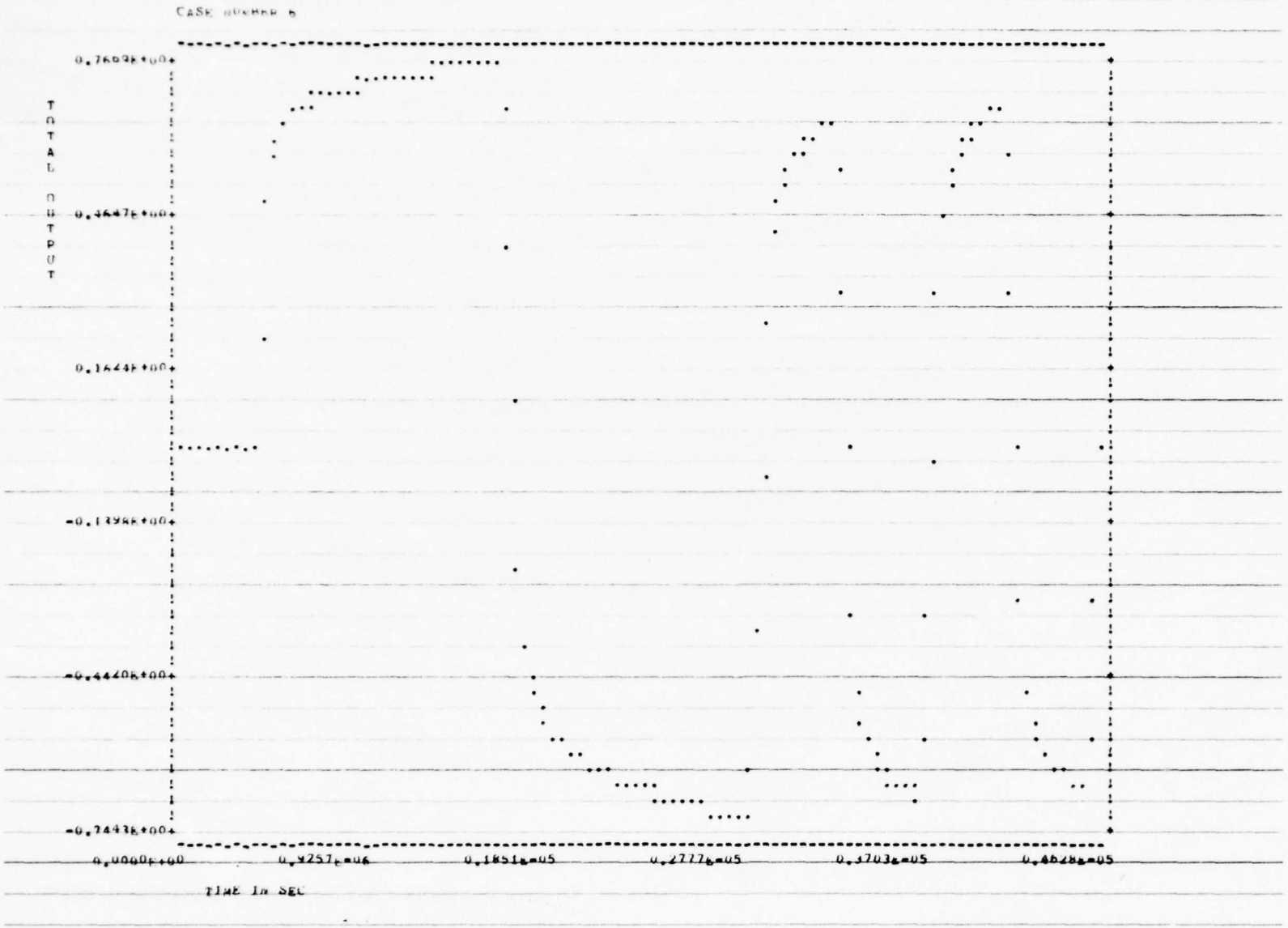
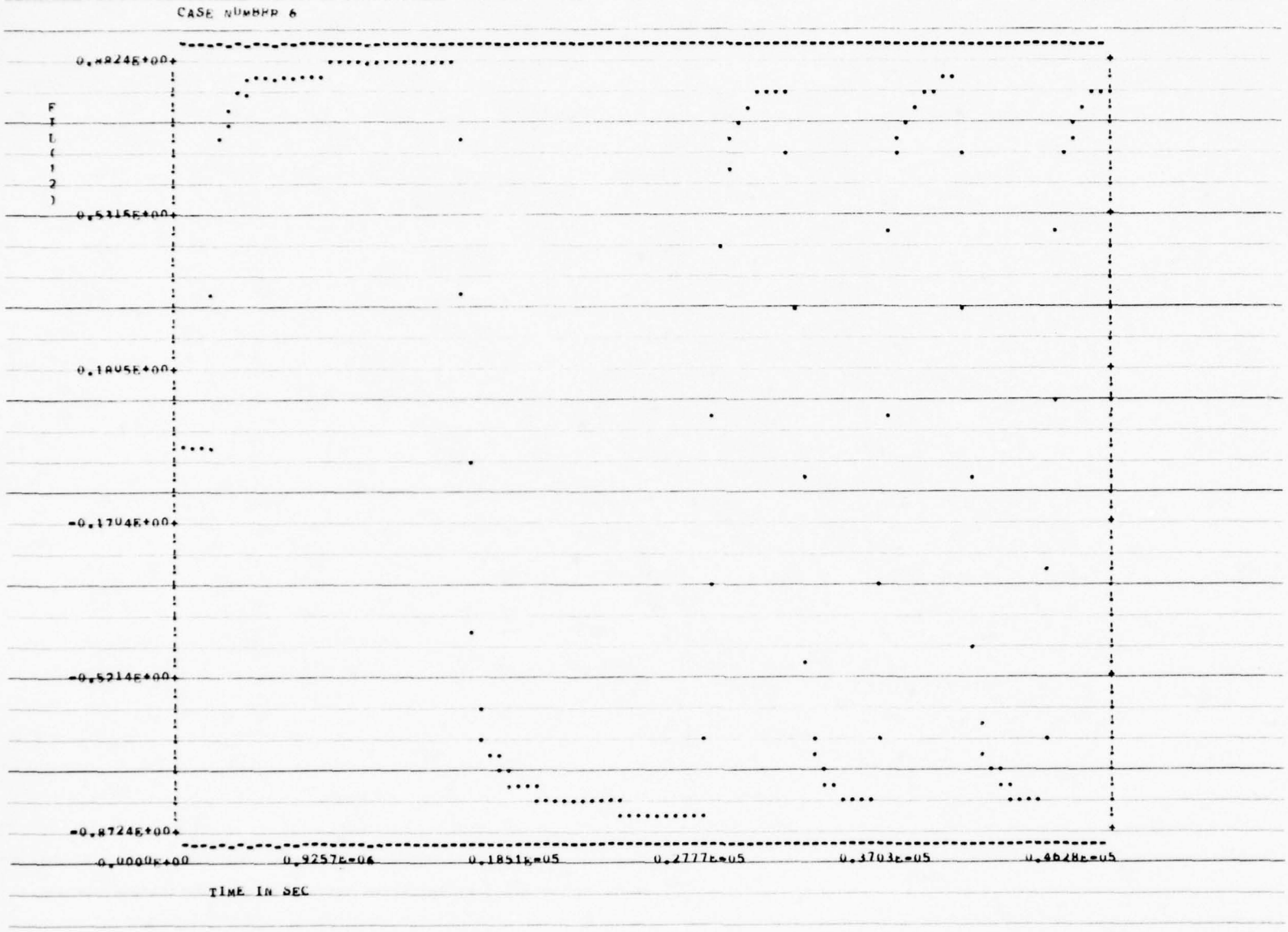
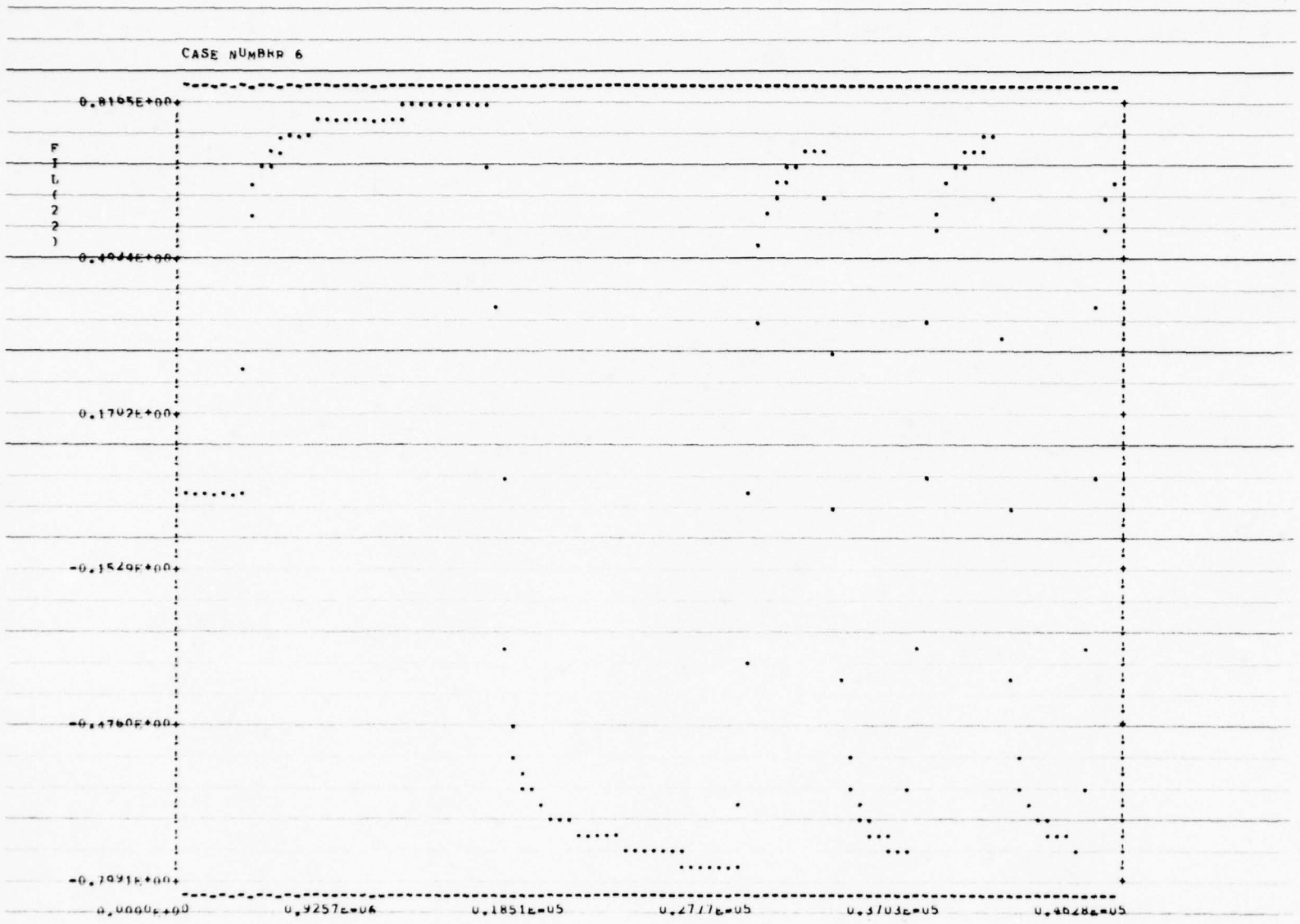
)
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

THE MINIMUM-MAXIMUM VALUES FOR THE VARIABLES IN CURVE 12 ARE EQUAL

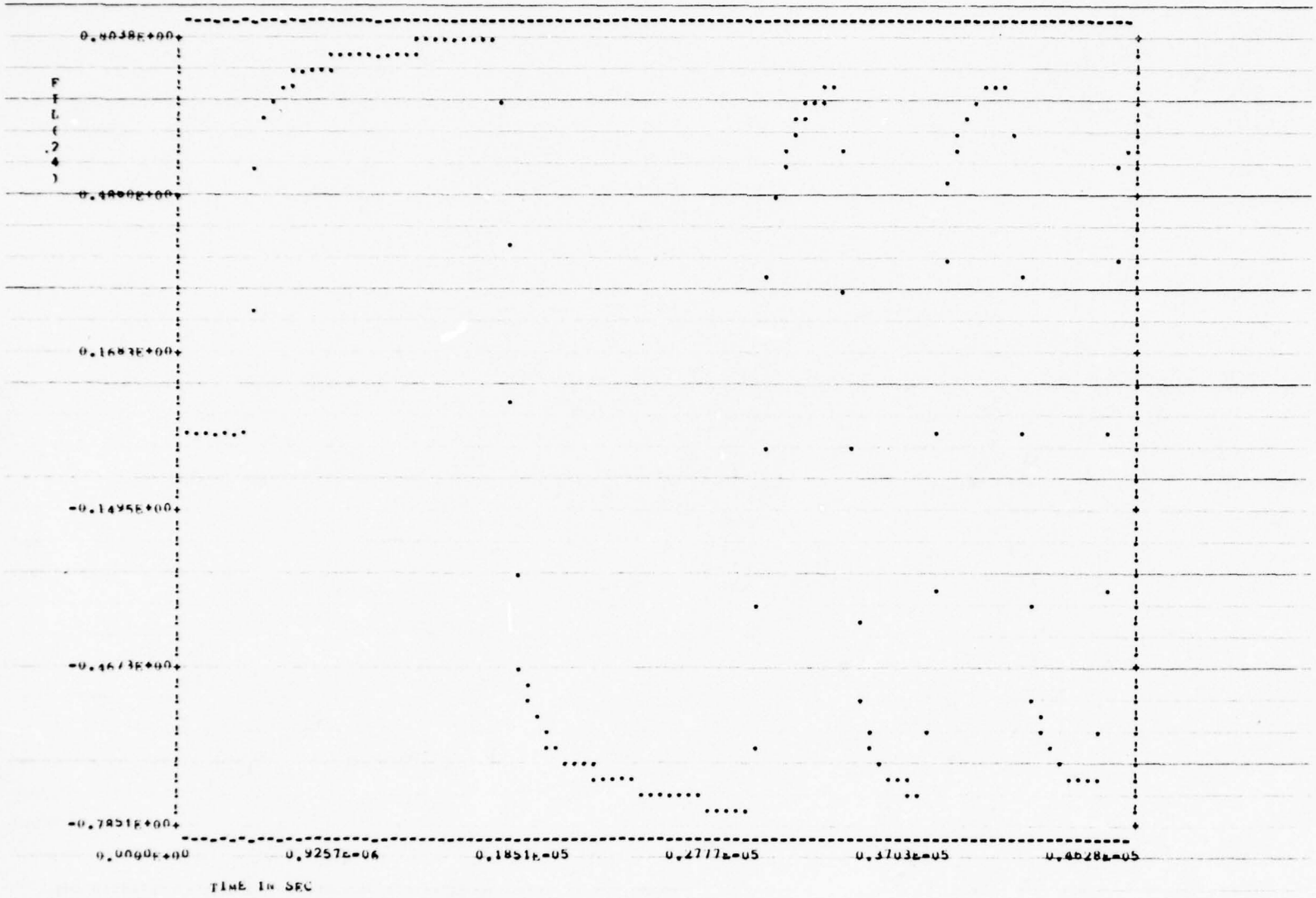

CASE NUMBER 6
TOTAL OUTPUT
0.76098E+00
0.36447E+00
0.16448E+00
-0.13988E+00
-0.44406E+00
-0.74436E+00
0.0000E+00
0.4257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

THE MINIMUM-MAXIMUM VALUES FOR THE VARIABLES IN CURVE 14 ARE EQUAL

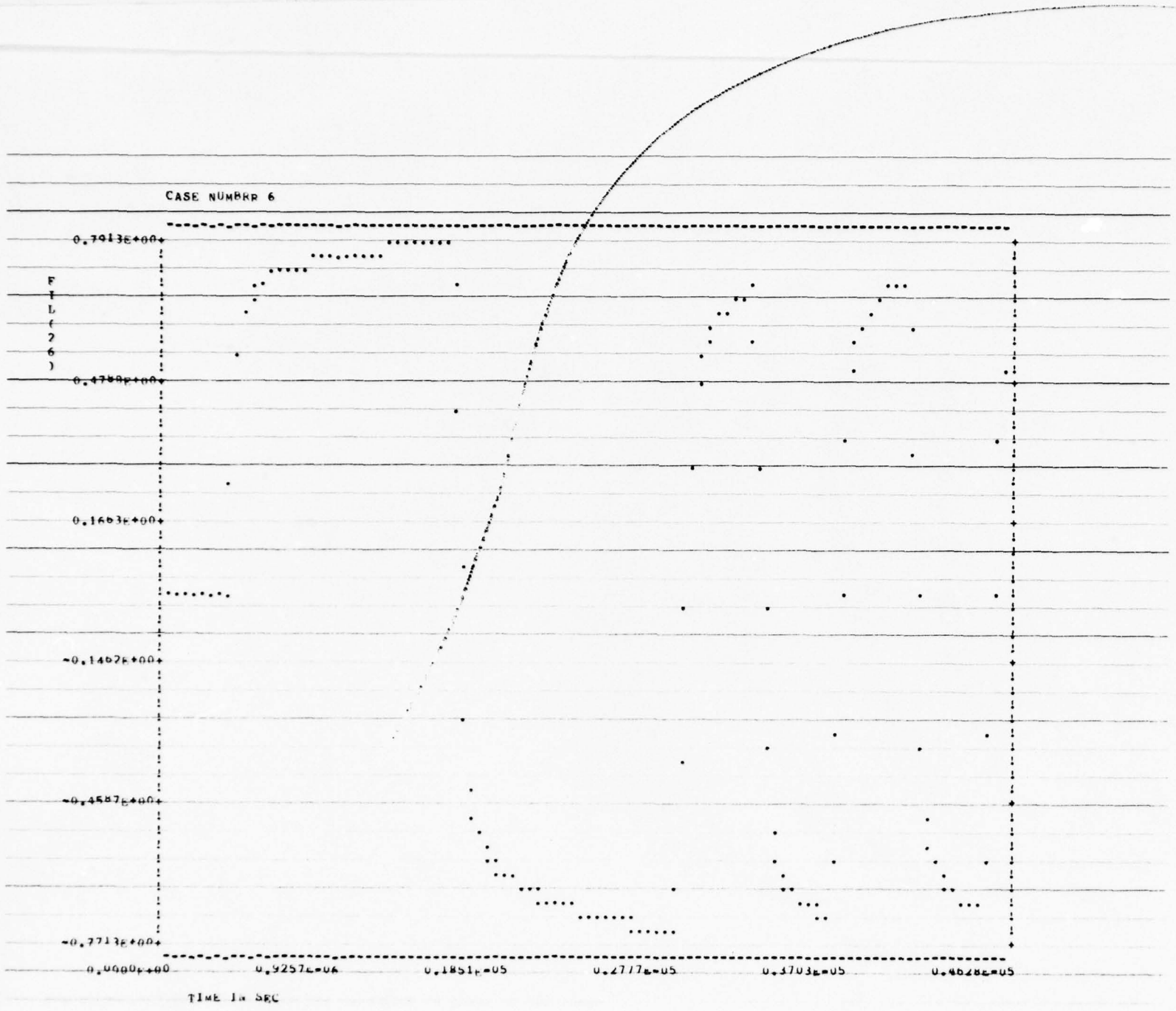

CASE NUMBER 6
F(1,2)
0.8824E+00
0.5315E+00
0.1805E+00
-0.1704E+00
-0.5214E+00
-0.8724E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC


CASE NUMBER 6
0.8195E+00
F
I
L
(
2
2
)
0.4944E+00
0.1792E+00
-0.1529E+00
-0.4760E+00
-0.7991E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

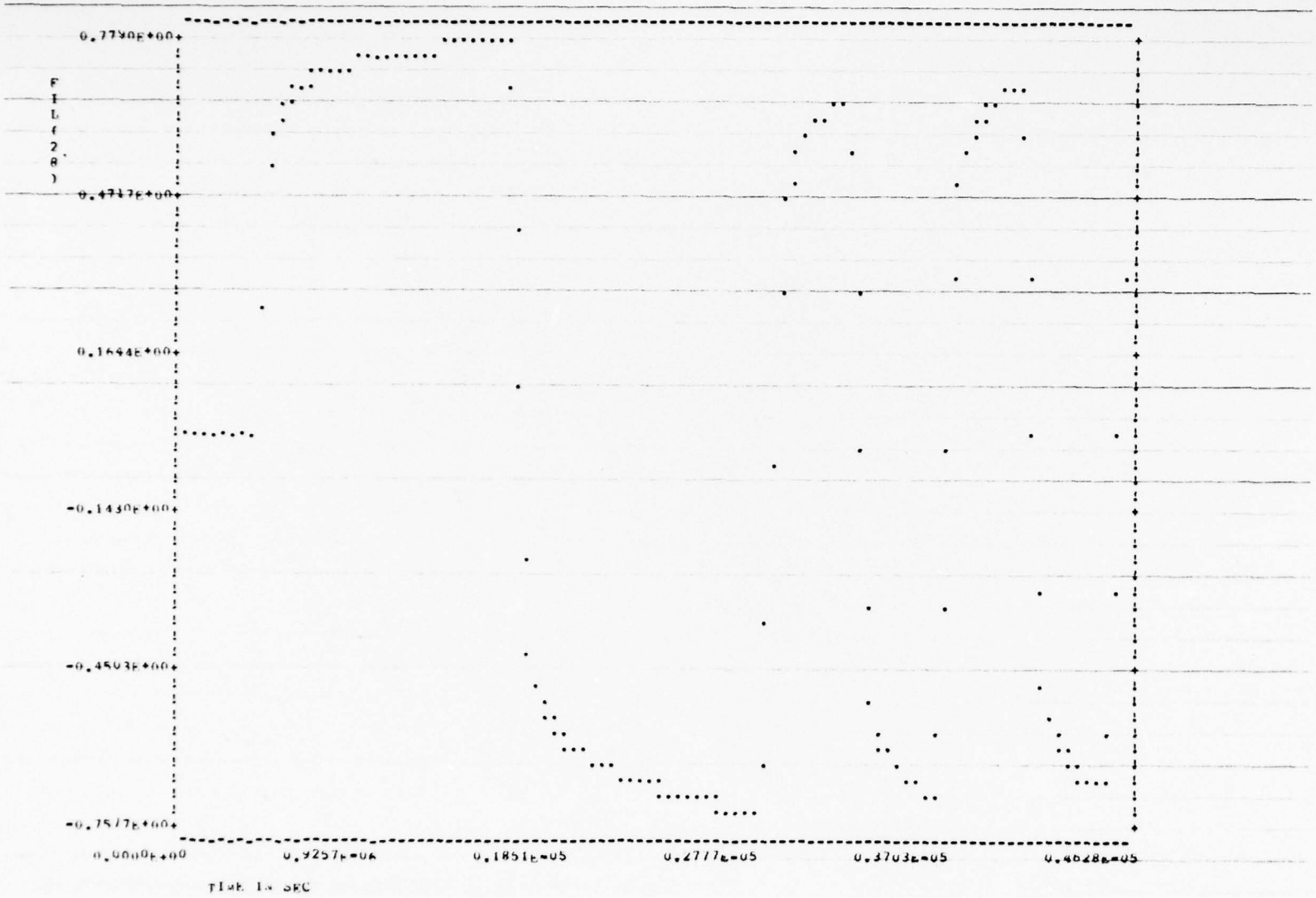
THE MINIMUM-MAXIMUM VALUES FOR THE VARIABLES IN CURVE 17 ARE EQUAL


CASE NUMBER 6
0.1683E+00
-0.1495E+00
-0.4673E+00
-0.7851E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
TIME IN SEC

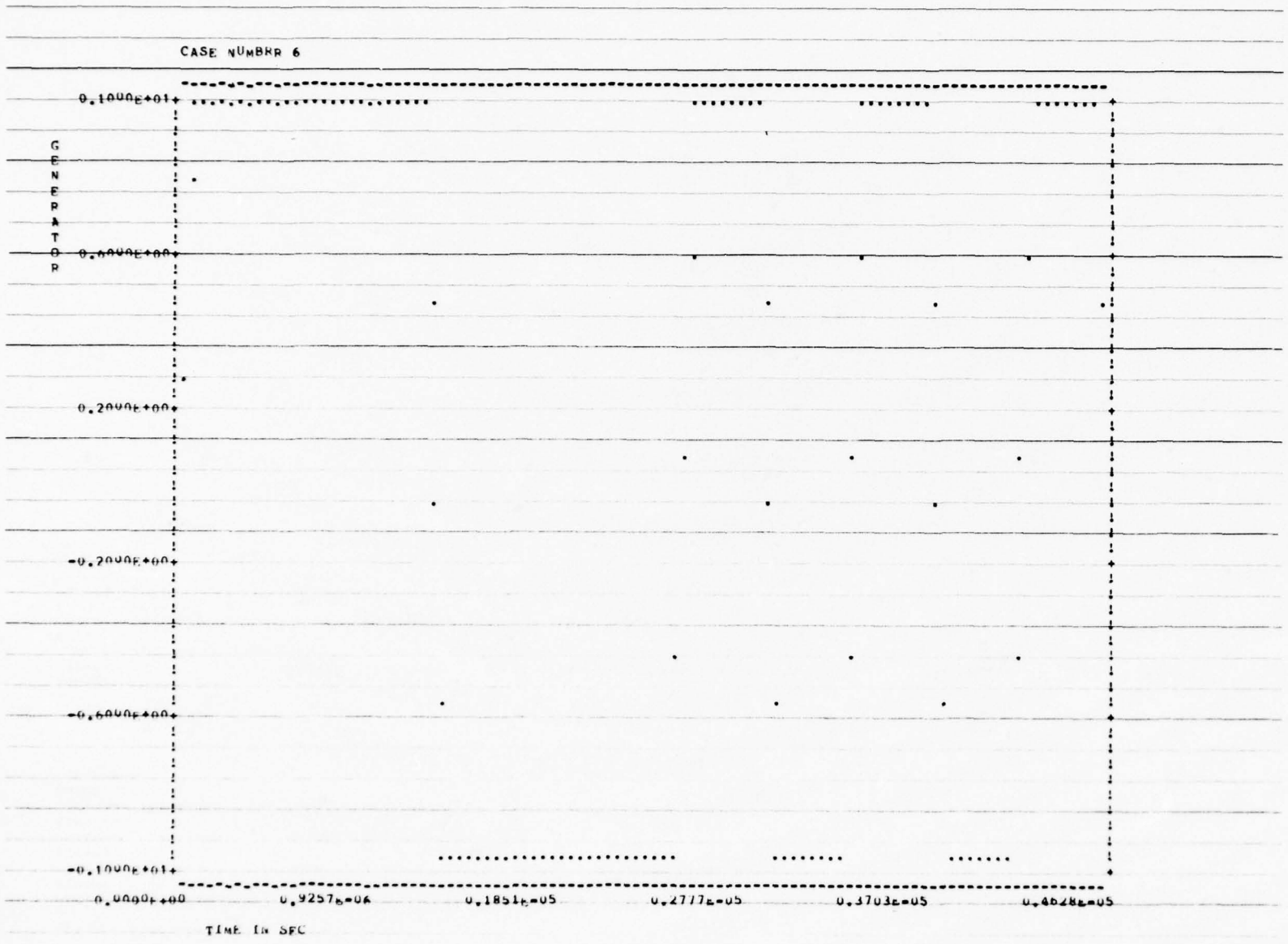
THE MINIMUM-MAXIMUM VALUES FOR THE VARIABLES IN CURVE 19 ARE EQUAL


CASE NUMBER 6
0.7913E+00
F
I
L
(
2
6
)
0.4789E+00
0.1663E+00
-0.1462E+00
-0.4587E+00
-0.7713E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

THE MINIMUM-MAXIMUM VALUES FOR THE VARIABLES IN CURVE 21 ARE EQUAL


CASE NUMBER 6
0.7730E+00
0.4717E+00
0.1644E+00
-0.1430E+00
-0.4503E+00
-0.7577E+00
0.0000E+00
0.9257E-04
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

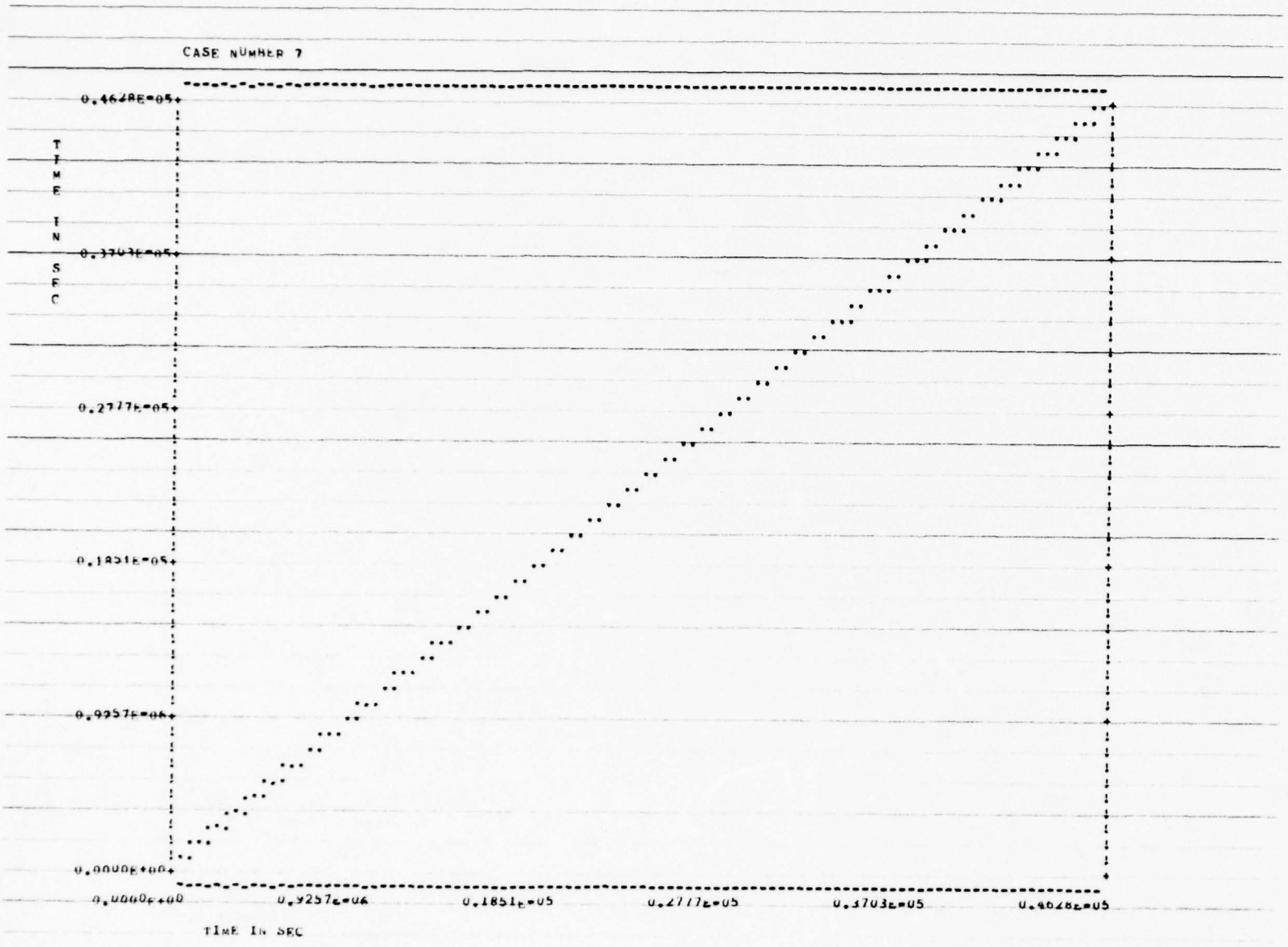
THE MINIMUM-MAXIMUM VALUES FOR THE VARIABLES IN CURVE 23 ARE EQUAL

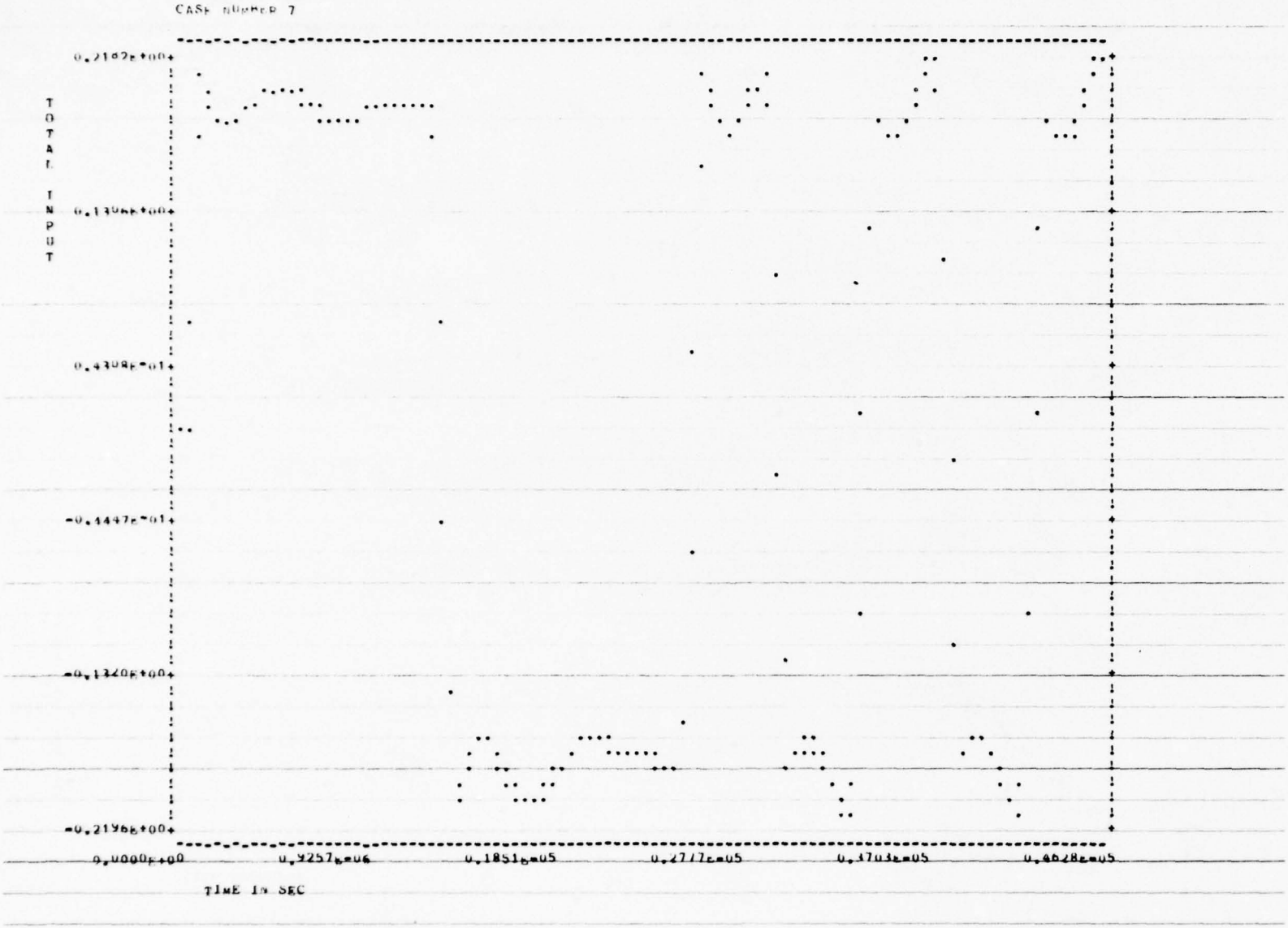

CASE NUMBER 6
0.1000E+01
0.0000E+00
0.2000E+00
-0.2000E+00
-0.6000E+00
-0.1000E+01
GENERATOR
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

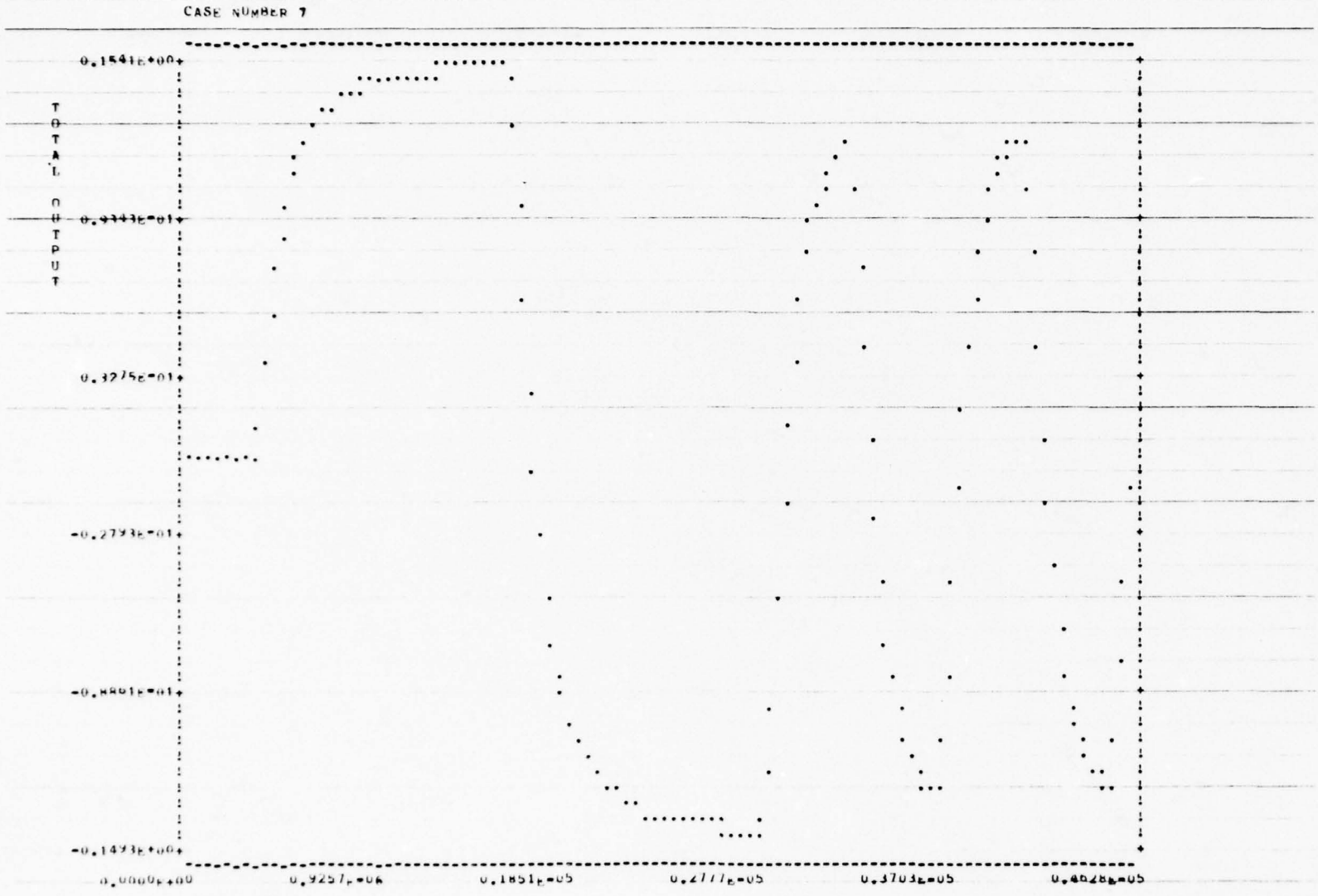
```
NEW JOB BEGINNING

$ECT DATA  .0000001330   350.0   112.0   10.0    0.89200  0.93570  0.00850  0.00000  0.00000 68.00000  2200.000
$TRAN1
 GAIN1=  0.5865100    , ANSG1=  0.2800000E+10,  TWOZ1=  0.9000000E+08, $
$TRAN2
 GAIN2=  0.2617000    , ANOI2=  0.2000000E+08, $
$GENER
 GAIN3=  0.2330000    , PNOI=  0.8400000E+08,  REF1= -0.1530000    , $
$STOR
 ISTOR=3*          0,          1,          0,          1,          0,          1,          0,
         1, 11*          0,          1,          0,          1,          0,          1,
         0,          1, 3*          0,  NPSKIP=          2,  LSTOR=3*          0,          10,
         0,         10,          0,         10,          0,         10, 11*          0,
        10,          0,         10,          0,         10,          0,         10,
3*          0, $
$GENER
 IGEN=          4,  GENMAX=  1.000000    ,  ISLOPE=  0.5000000E-07,  NCCIN=         94,  NCCR=         32,
 ZG=   68.00000    , $
$SKIN
 GI1=  0.9710000    ,  GI2=  0.7900000E-02,  GI3=  0.6065000E-02, $

PLOTTER CALLED. 24 VARIABLES SPECIFIED. 24 PLOTS REQUESTED.
```

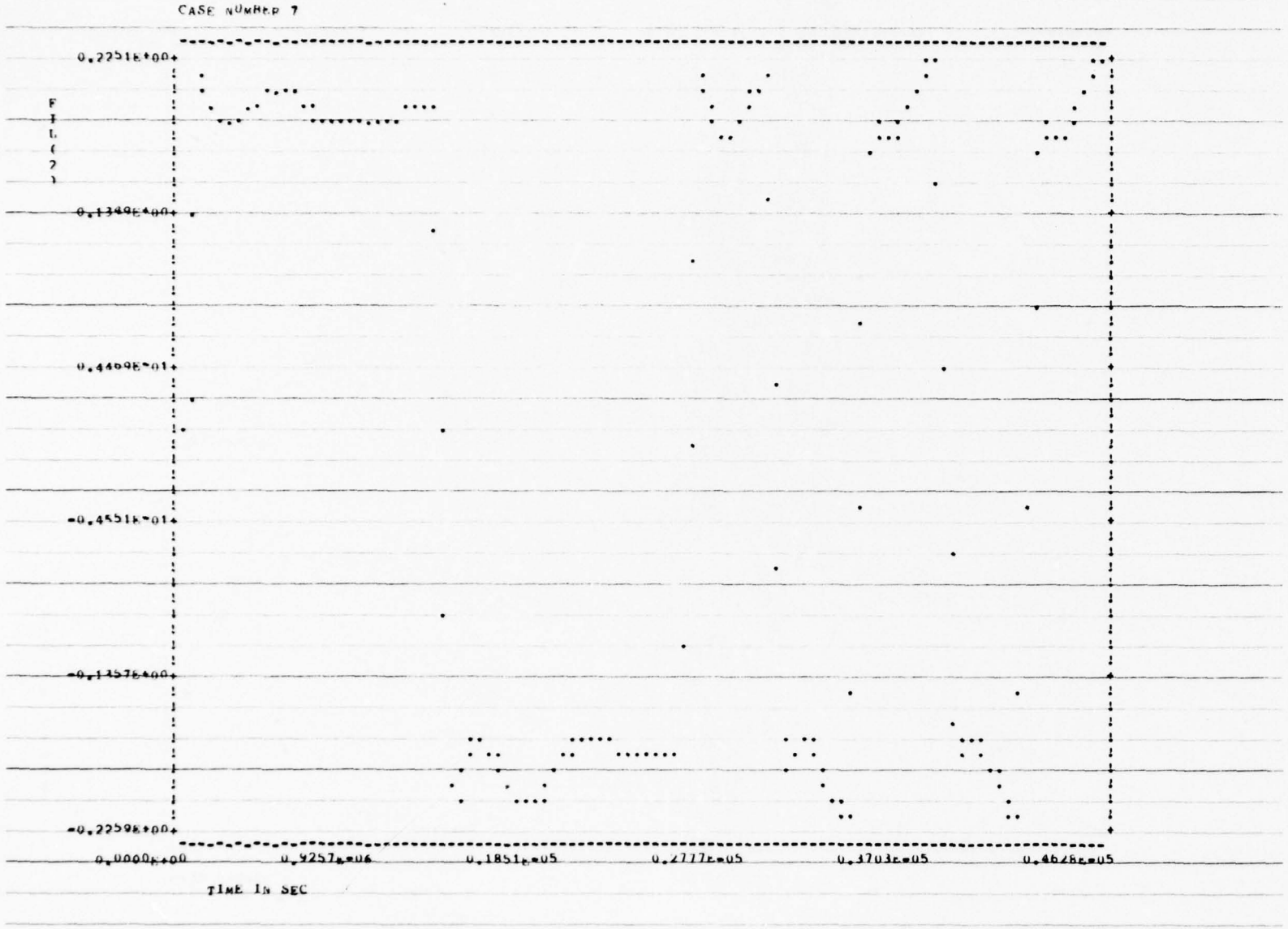
DATA BUS SIMULATION OF A 68 OHM TWISTED SHIELDED PAIR

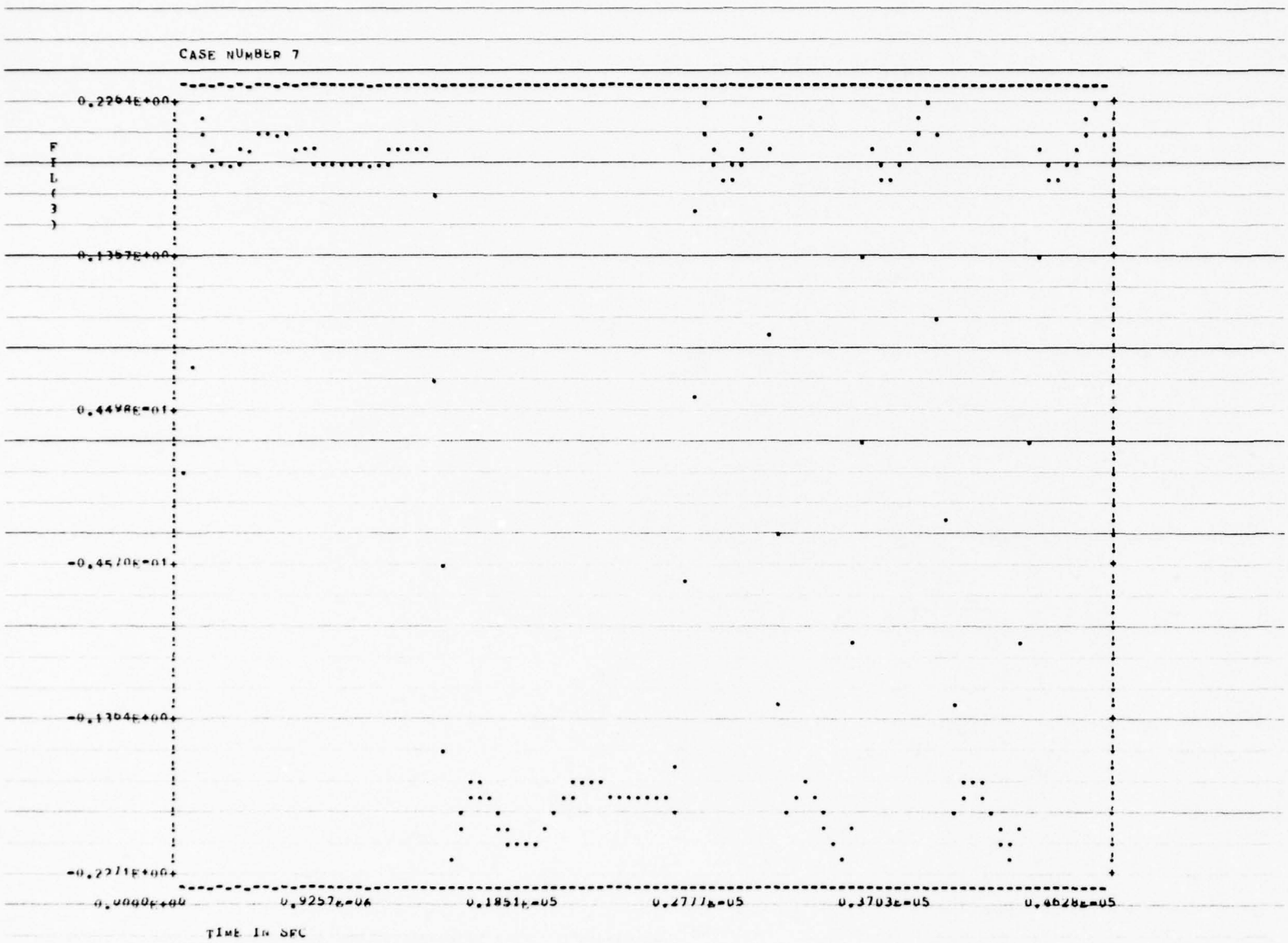
THE MINIMUM-MAXIMUM VALUES FOR THE VARIABLES IN CURVE 23 ARE EQUAL


CASE NUMBER 7
TIME IN SEC
0.4628E+05
0.3703E+05
0.2777E+05
0.1851E+05
0.9257E+04
0.0000E+00
0.0000E+00
0.9257E+04
0.1851E+05
0.2777E+05
0.3703E+05
0.4628E+05
TIME IN SEC

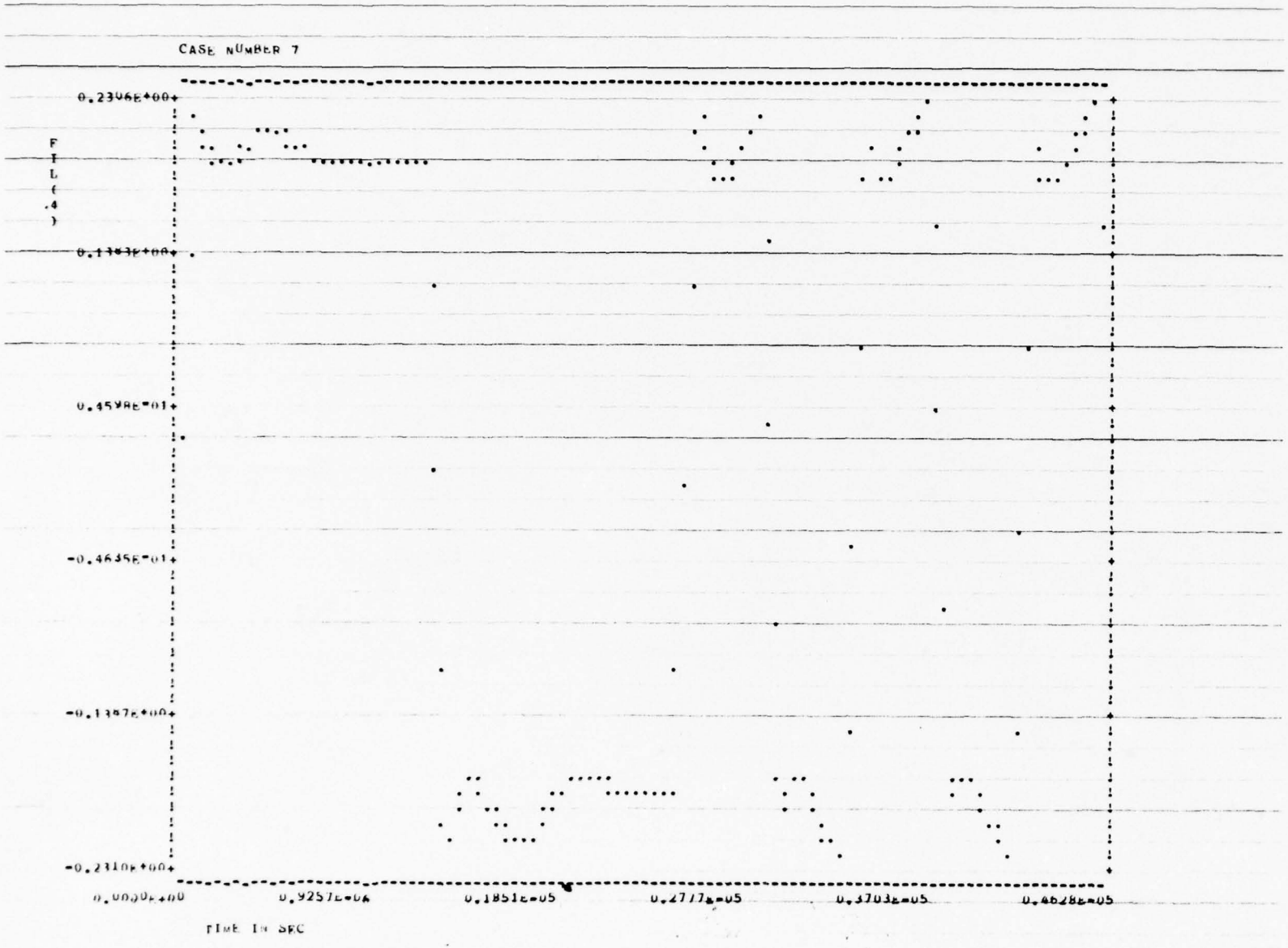

CASE NUMBER 7
TOTAL INPUT
0.2162E+00
0.1390E+00
0.4308E-01
-0.4447E-01
-0.1320E+00
-0.2196E+00
0.0000E+00
0.9257E+06
0.1851E+05
0.2777E+05
0.3703E+05
0.4628E+05
TIME IN SEC

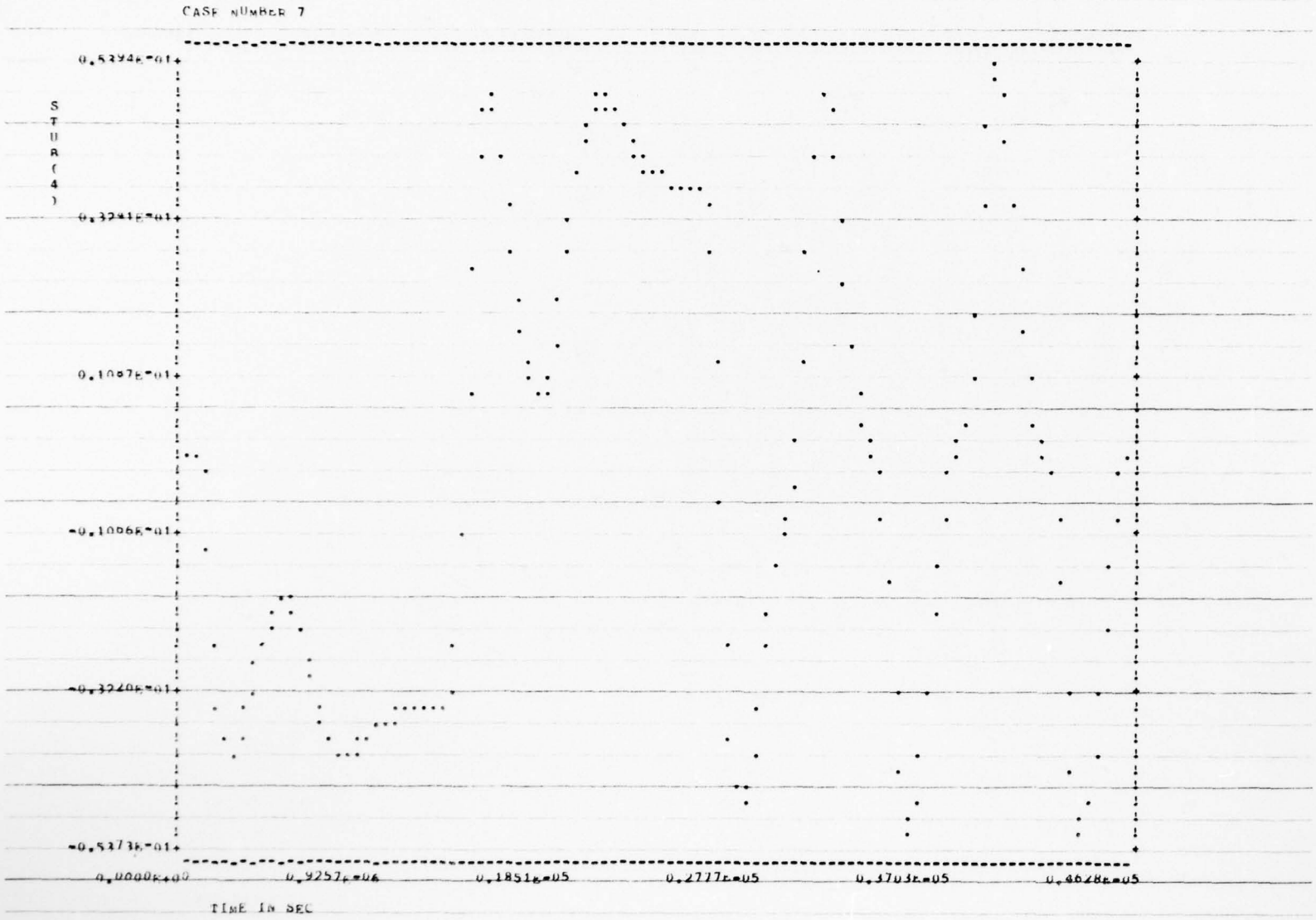

CASE NUMBER 7
TOTAL OUTPUT
0.1541E+00
0.3275E-01
-0.2793E-01
-0.1493E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
TIME IN SEC

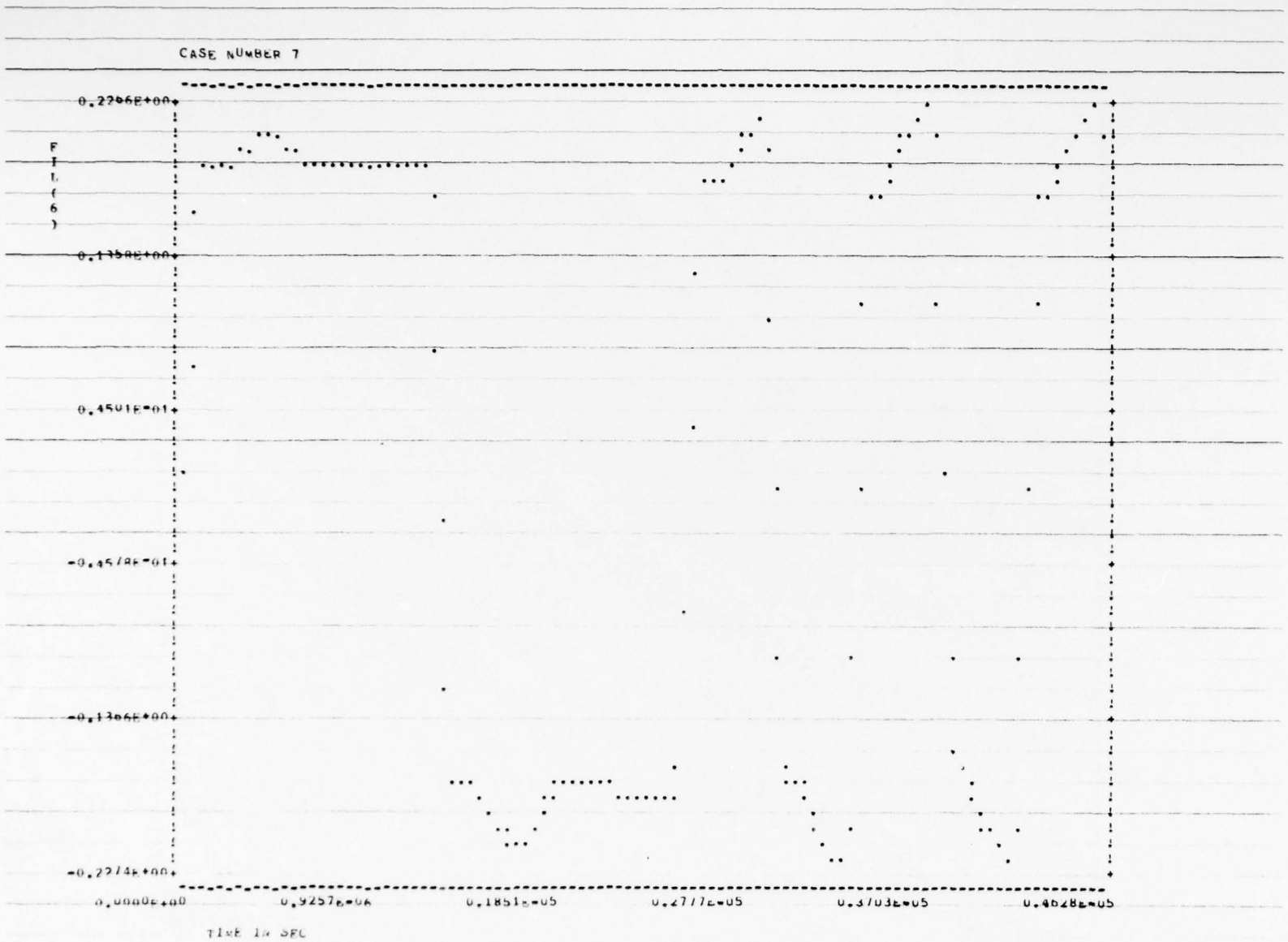

CASE NUMBER 7
0.2251E+00
F
I
L
(
2
)
0.1349E+00
0.4499E-01
-0.4551E-01
-0.1357E+00
-0.2259E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

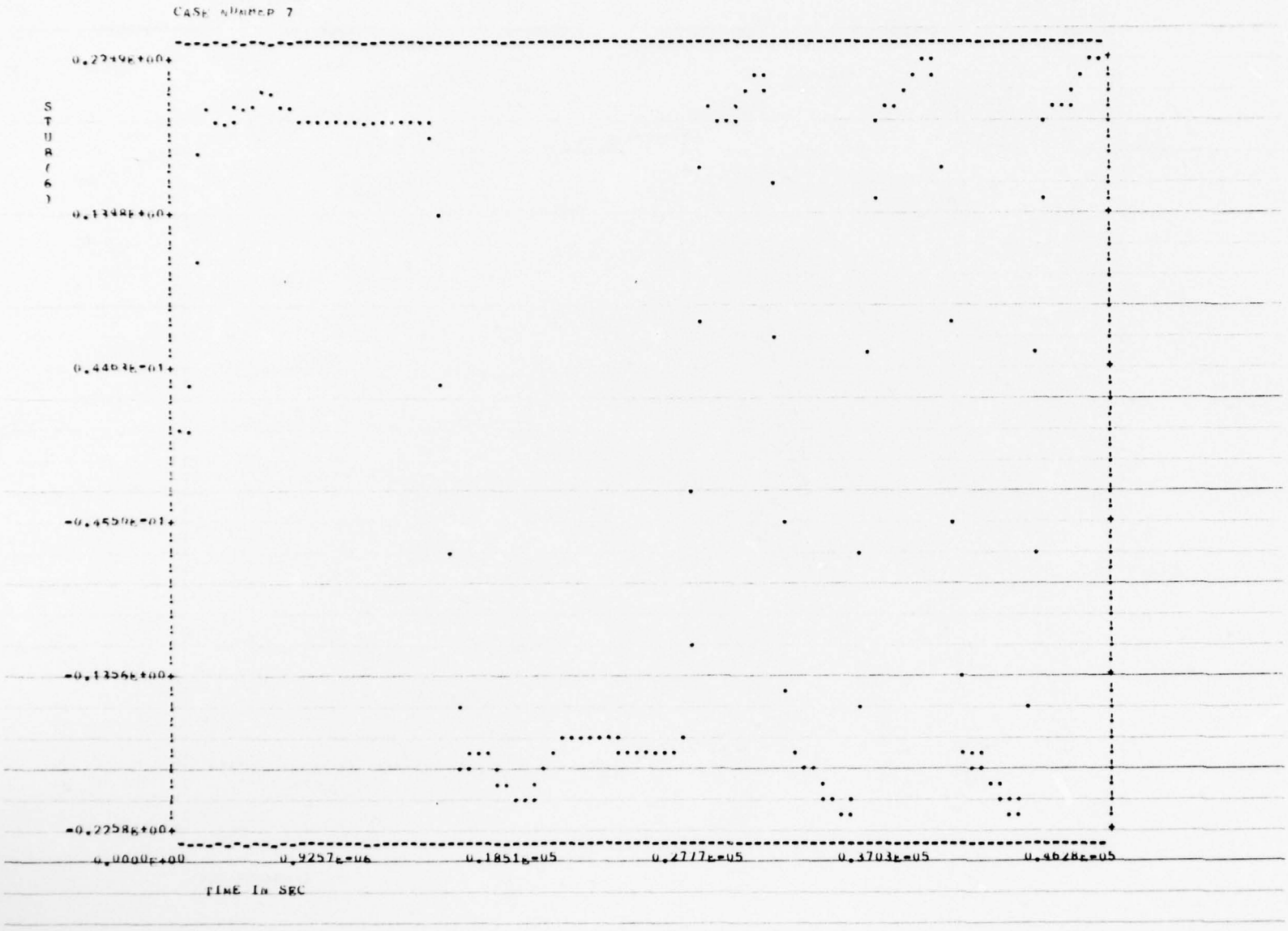

CASE NUMBER 7
F
I
L
(
3
)
0.2264E+00
0.1357E+00
0.4498E-01
-0.4570E-01
-0.1364E+00
-0.2271E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

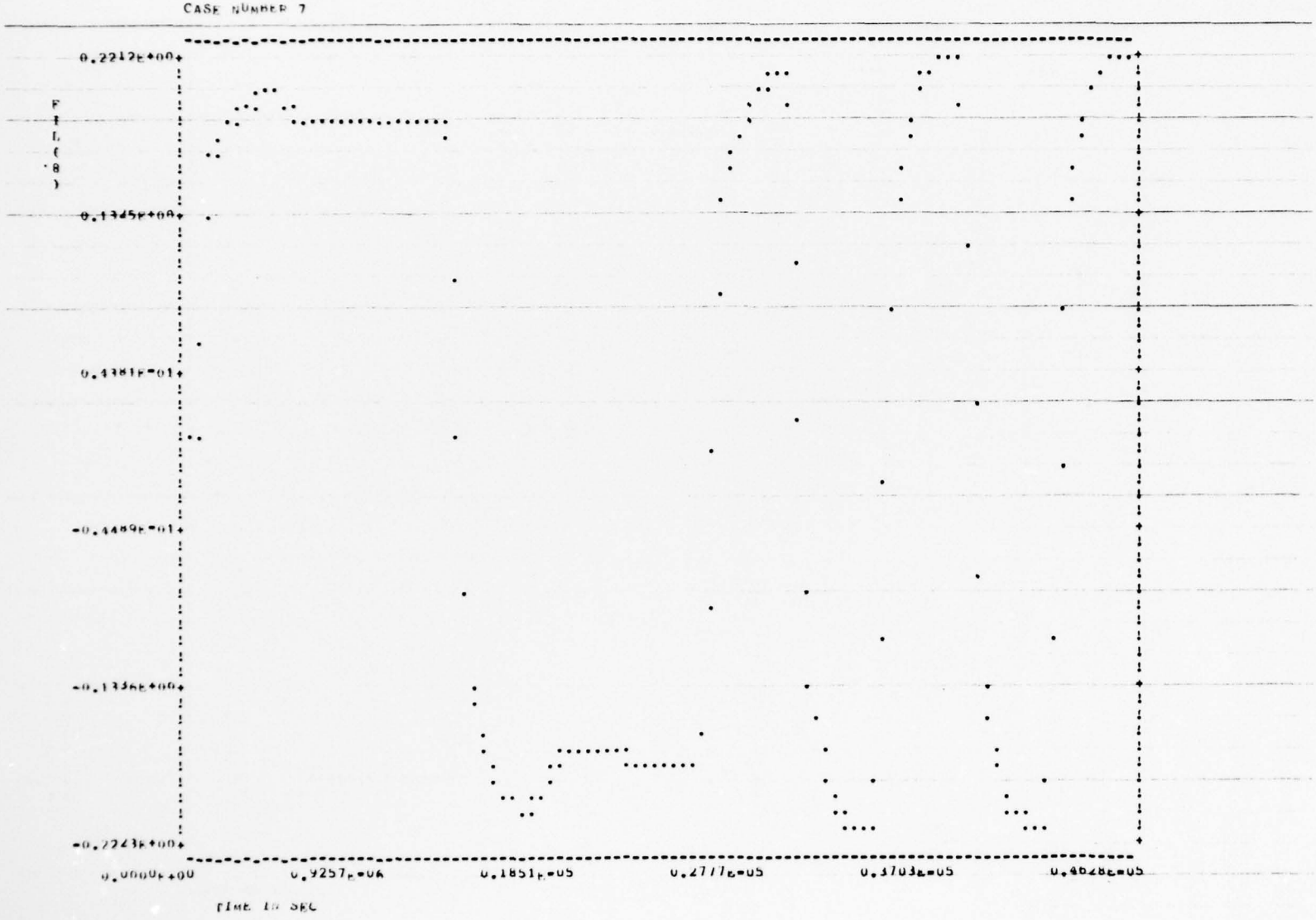
THE MINIMUM-MAXIMUM VALUES FOR THE VARIABLES IN CURVE 6 ARE EQUAL

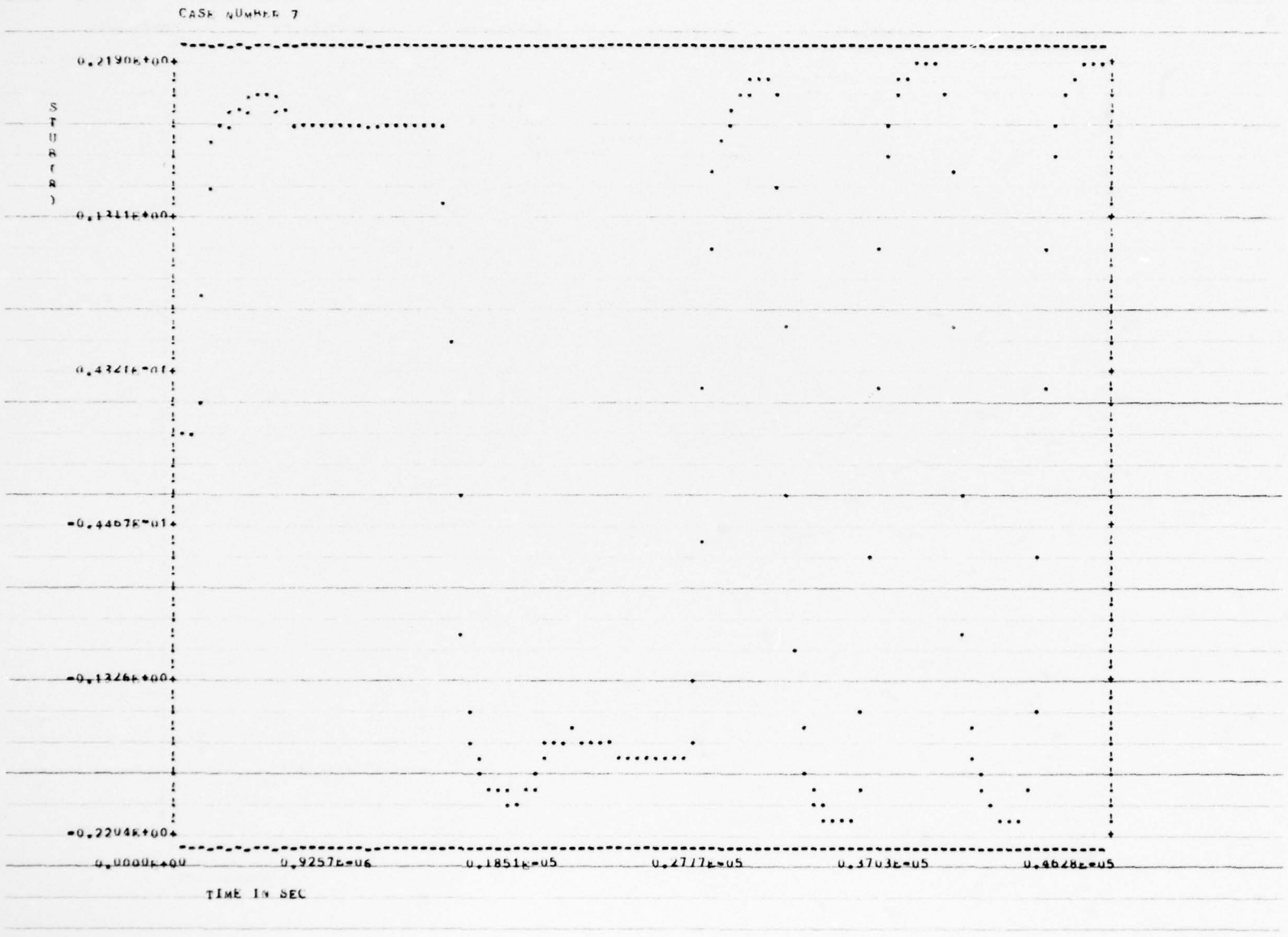

CASE NUMBER 7
0.2306E+00
F
I
L
(
.4
)
0.4598E-01
-0.4635E-01
-0.1387E+00
-0.2310E+00
0.0000E+00
0.9257E-04
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

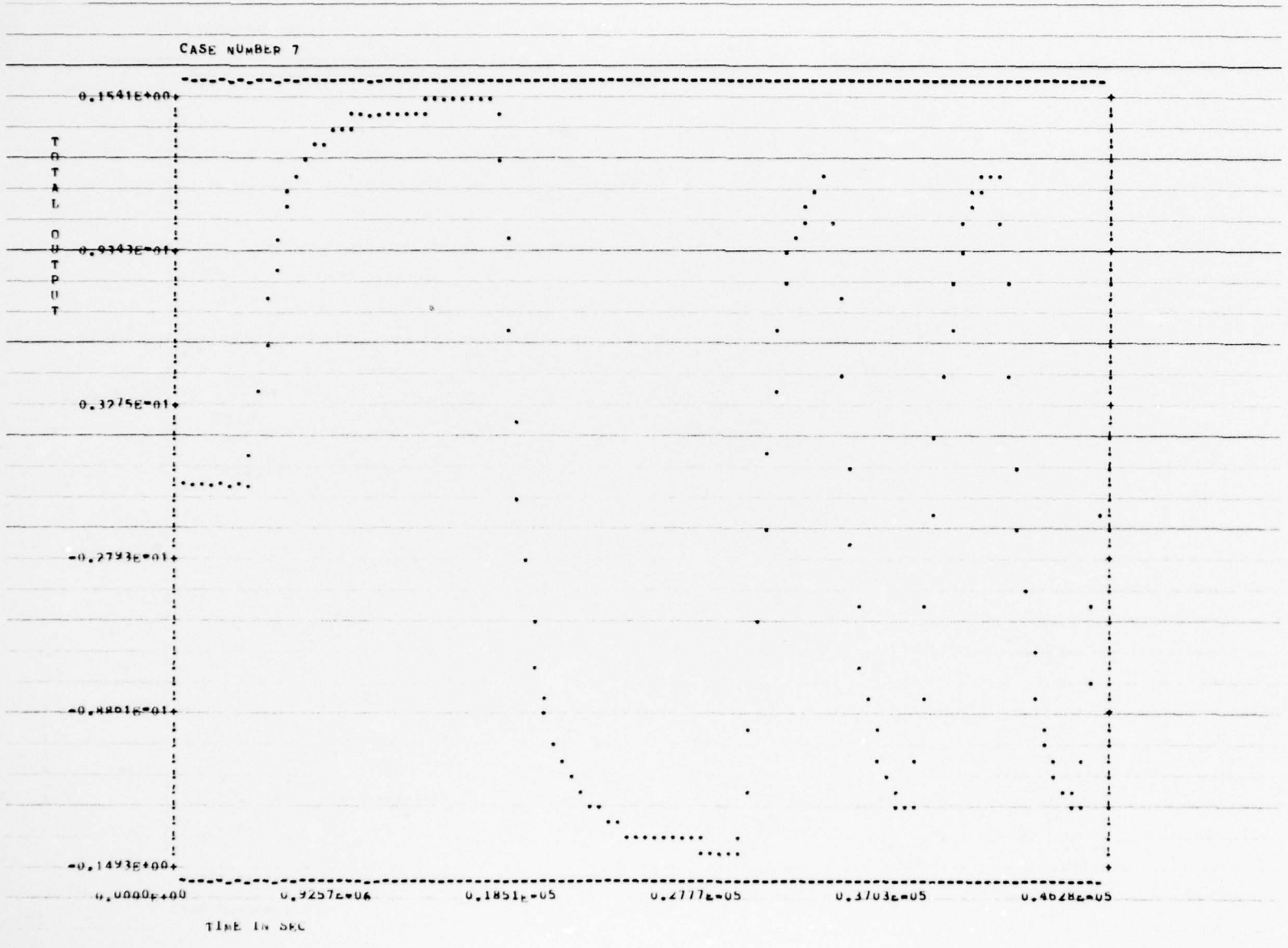

CASE NUMBER 7
STUR(4)
0.5394E-01
0.3241E-01
0.1087E-01
-0.1096E-01
-0.3240E-01
-0.5373E-01
0.0000E+00
0.9257E+04
0.1851E+05
0.2777E+05
0.3703E+05
0.4628E+05
TIME IN SEC

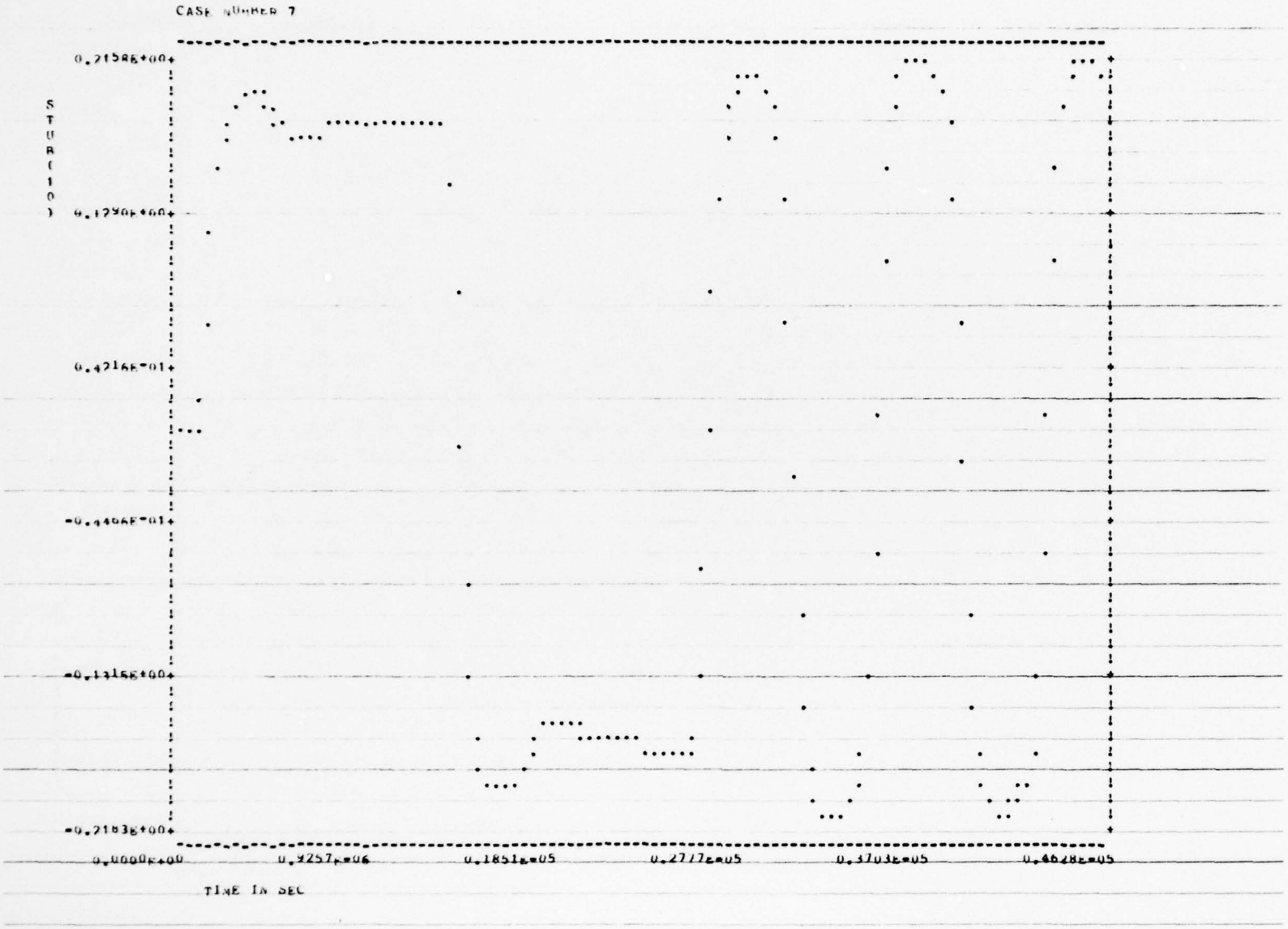

CASE NUMBER 7
F
i
f
6
)
0.2296E+00
0.1358E+00
0.4501E-01
-0.4578E-01
-0.1386E+00
-0.2274E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

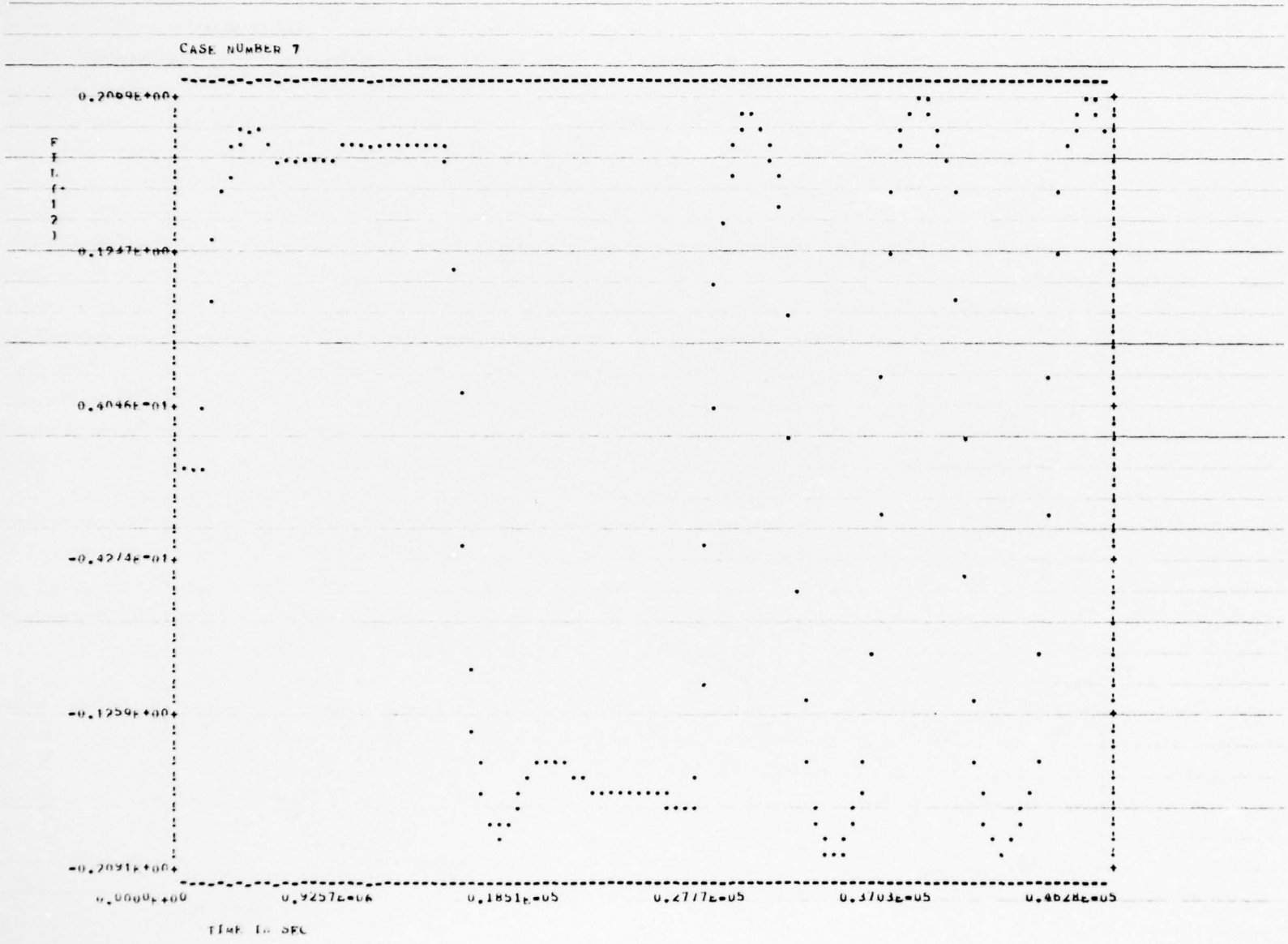

CASE NUMBER 7
STUB(6)
0.2249E+00
0.1348E+00
0.4493E-01
-0.4550E-01
-0.1356E+00
-0.2258E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

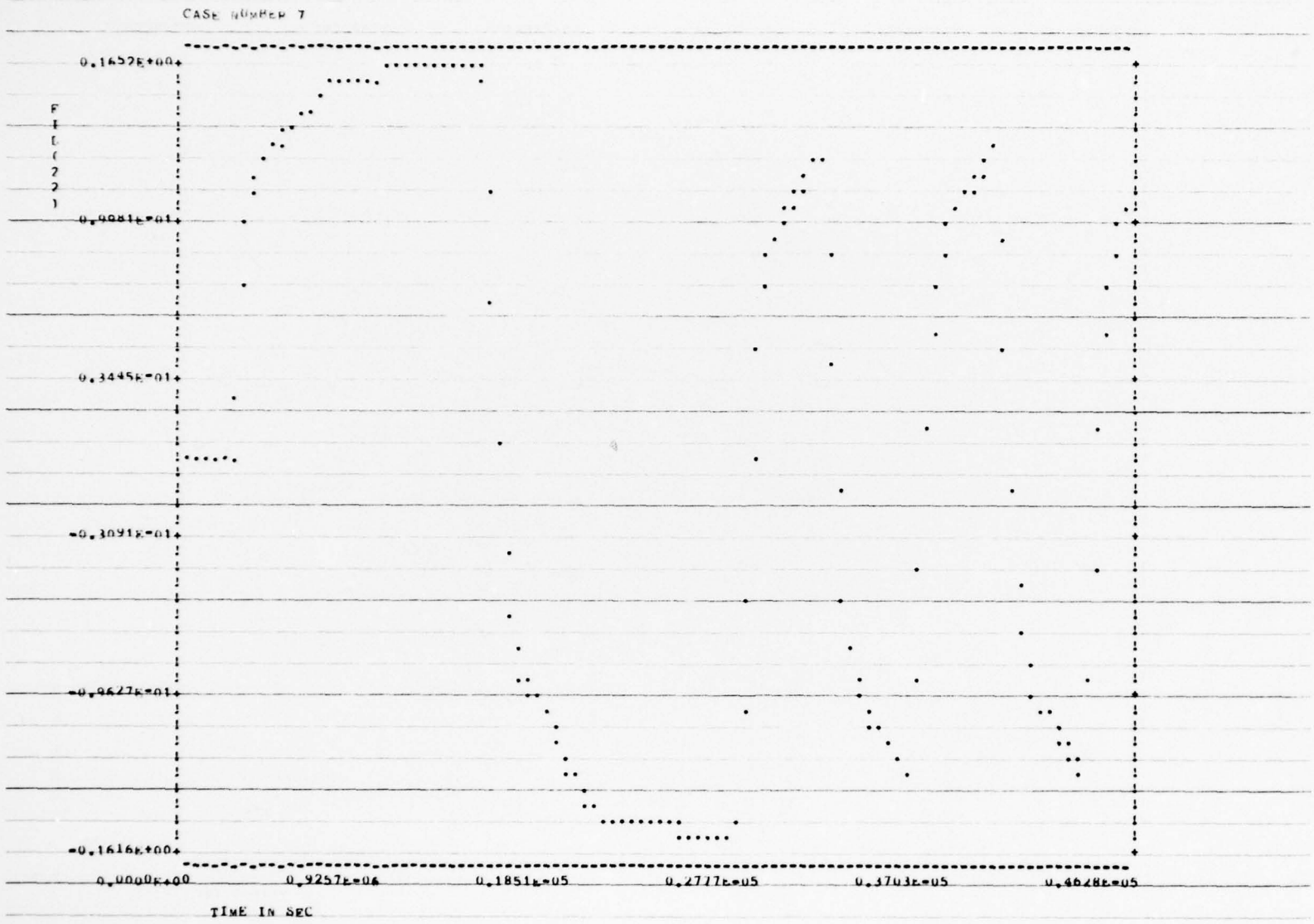

CASE NUMBER 7
0.2212E+00
F
I
L
(
8
)
0.1345E+00
0.4381E-01
-0.4489E-01
-0.1356E+00
-0.2243E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

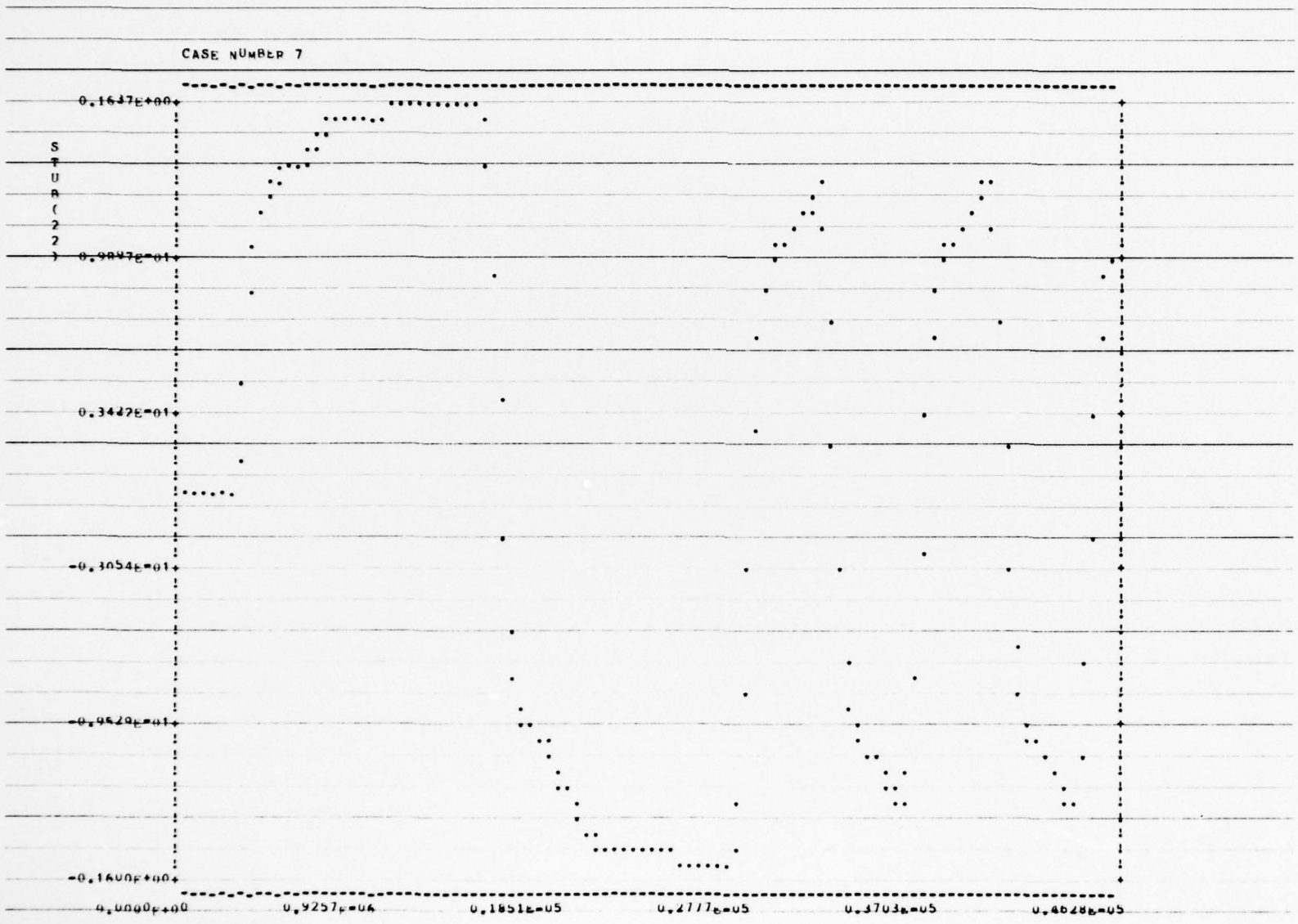

CASE NUMBER 7
0.2190E+00
0.1311E+00
0.4327E-01
-0.4467E-01
-0.1326E+00
-0.2204E+00
STUR(R)
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

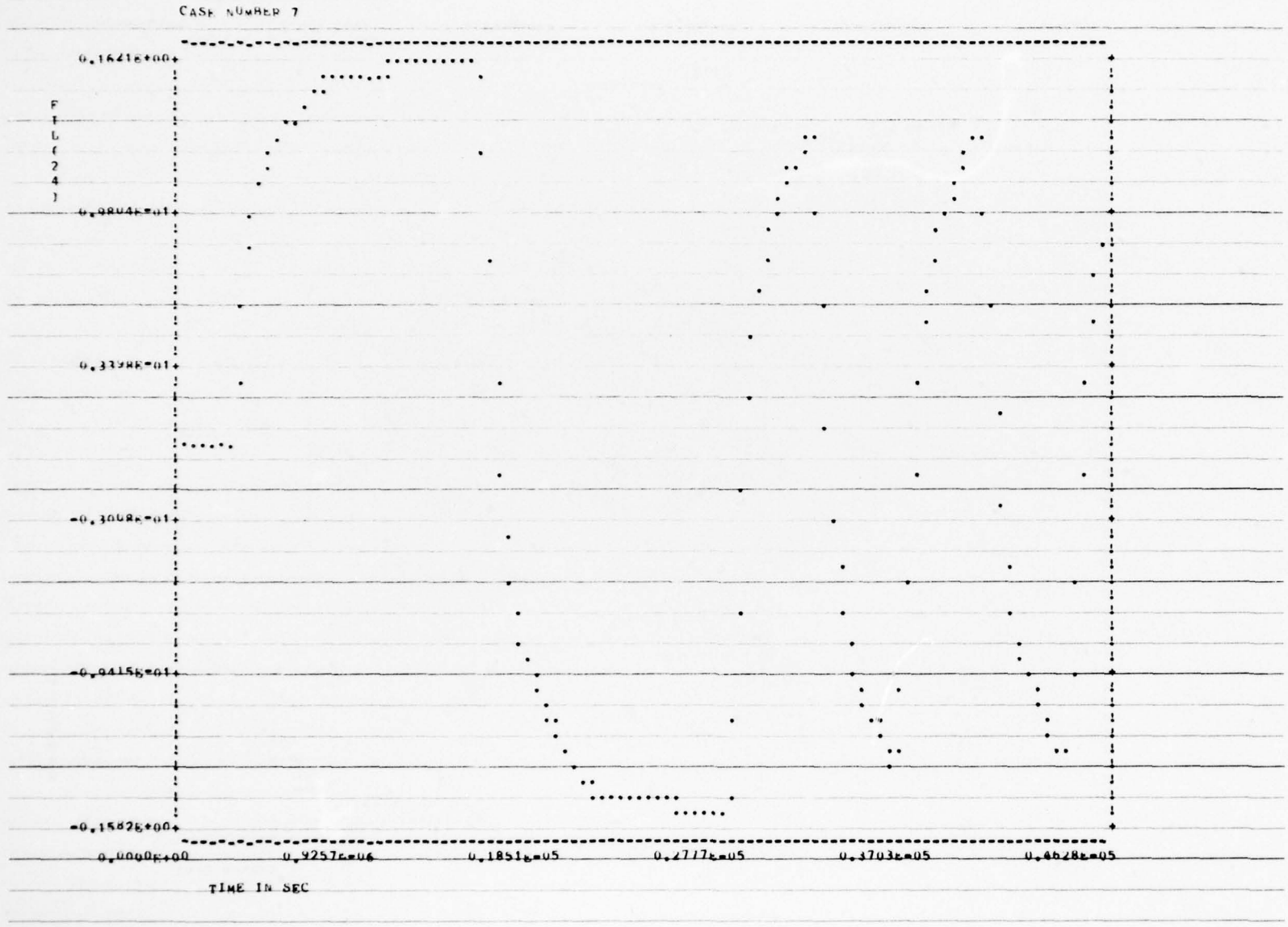

CASE NUMBER 7
0.1541E+00
0.9343E-01
0.3275E-01
-0.2793E-01
-0.8801E-01
-0.1493E+00
TOTAL OUTPUT
0.0000E+00
0.9257E+04
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

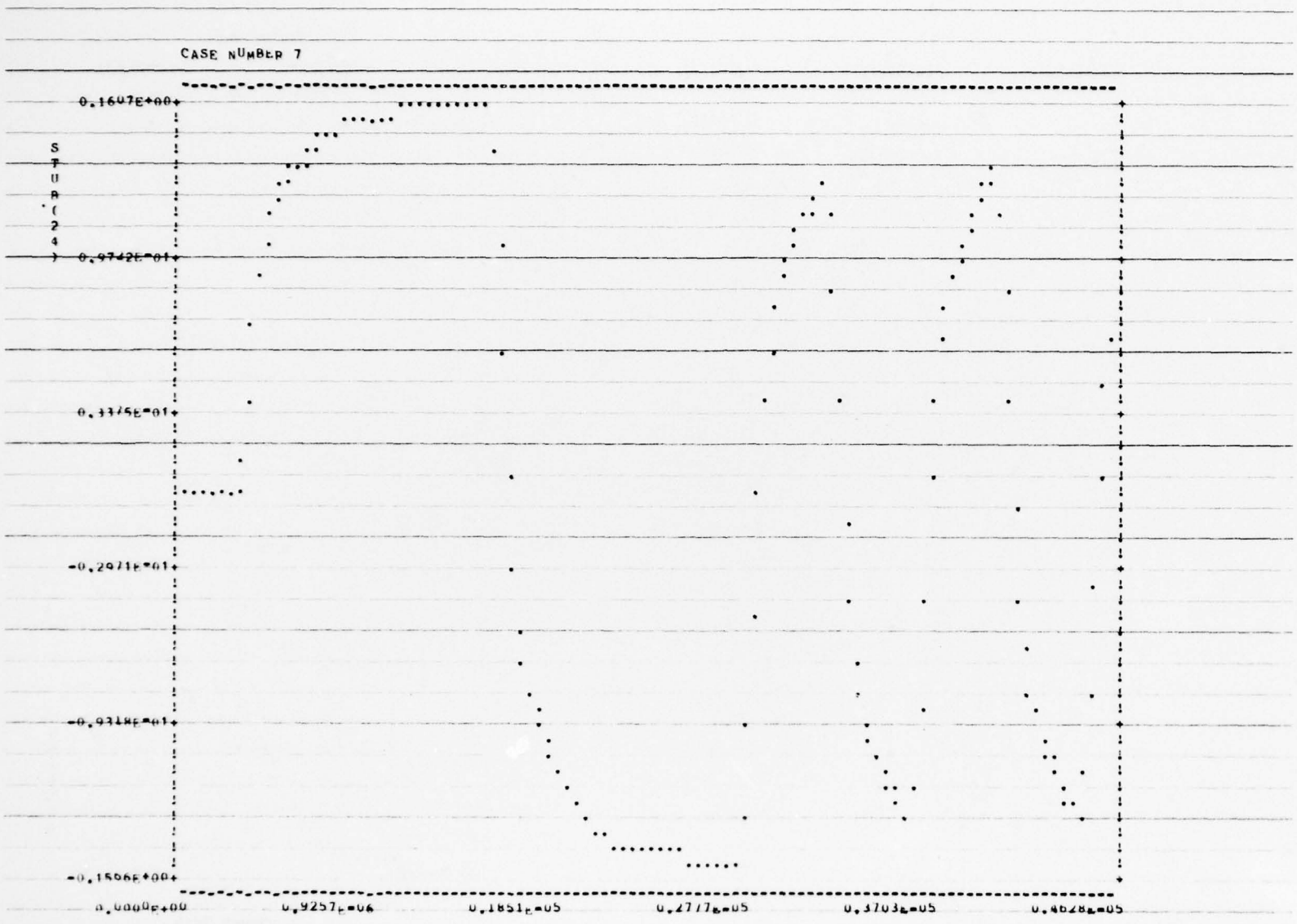

CASE NUMBER 7
STUB(10)
0.2158E+00
0.1290E+00
0.4216E-01
-0.4406E-01
-0.1315E+00
-0.2183E+00
0.0000E+00
0.9257E+06
0.1851E+05
0.2777E+05
0.3703E+05
0.4628E+05
TIME IN SEC

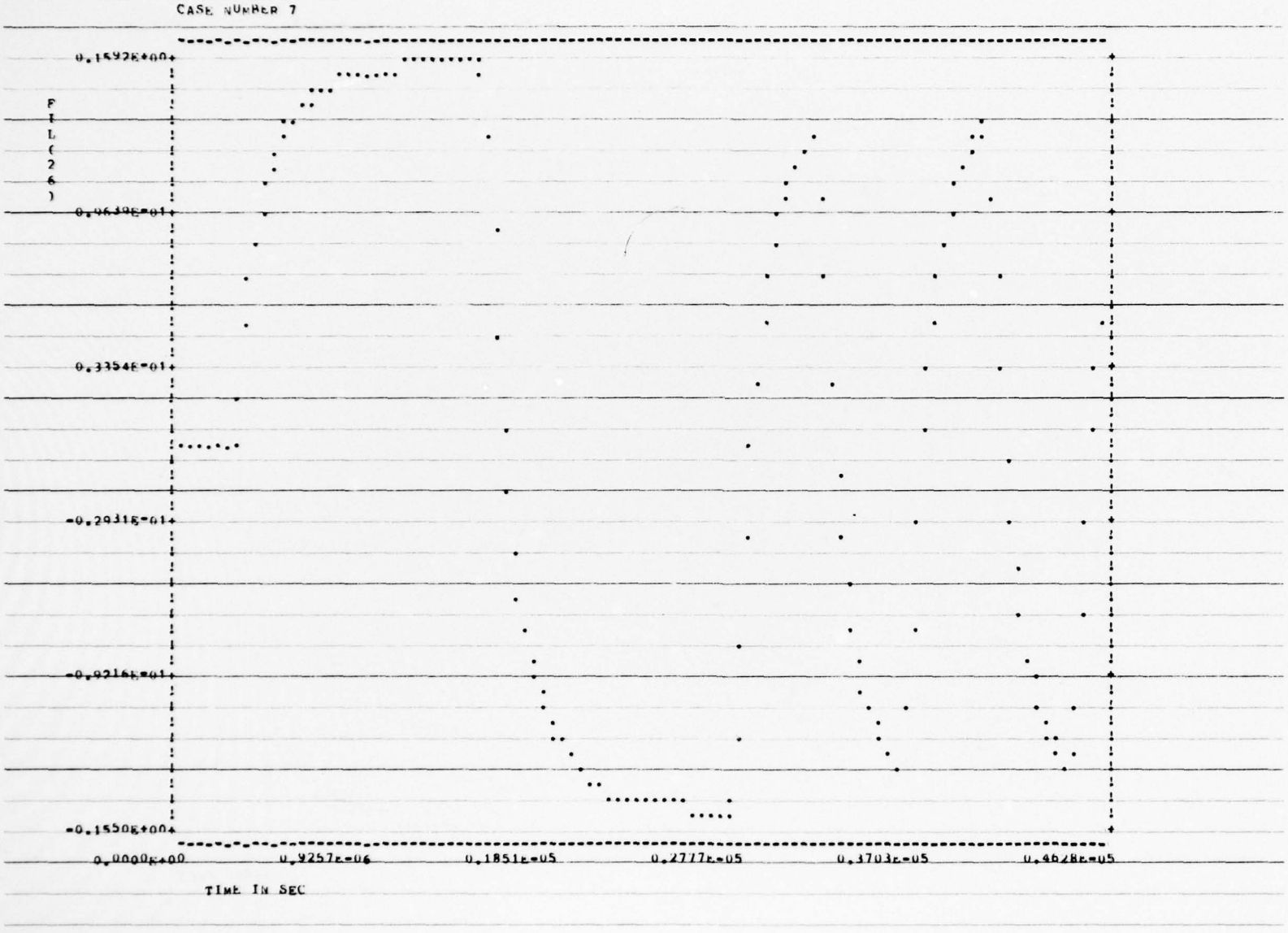

CASE NUMBER 7
0.2009E+00
F
I
L
F-
1
2
)
0.1947E+00
0.4046E-01
-0.4274E-01
-0.1259E+00
-0.2091E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

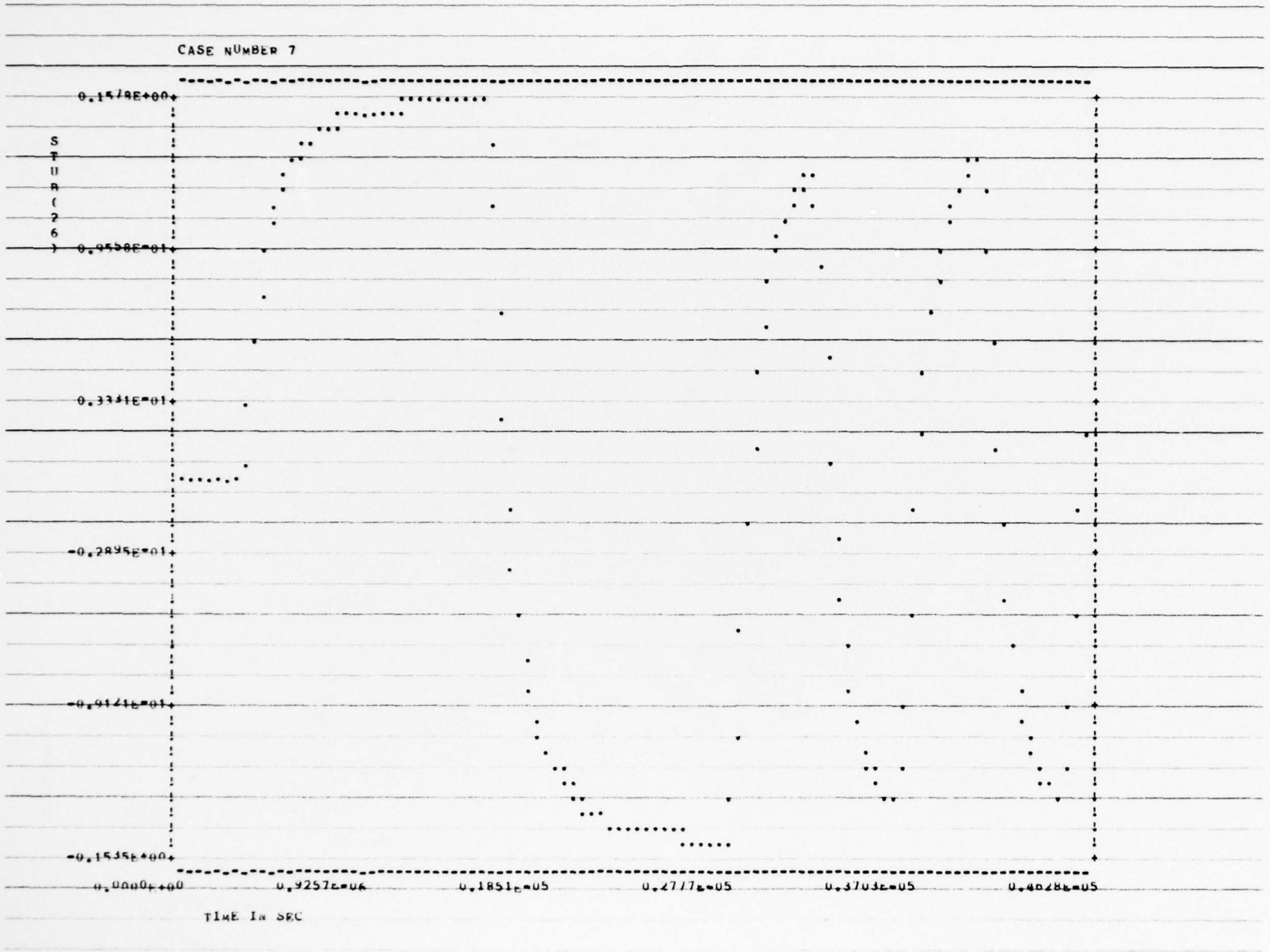

CASE NUMBER 7
0.1652E+00
0.9881E-01
0.3445E-01
-0.3091E-01
-0.9627E-01
-0.1616E+00
F
I
G
(
2
2
)
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

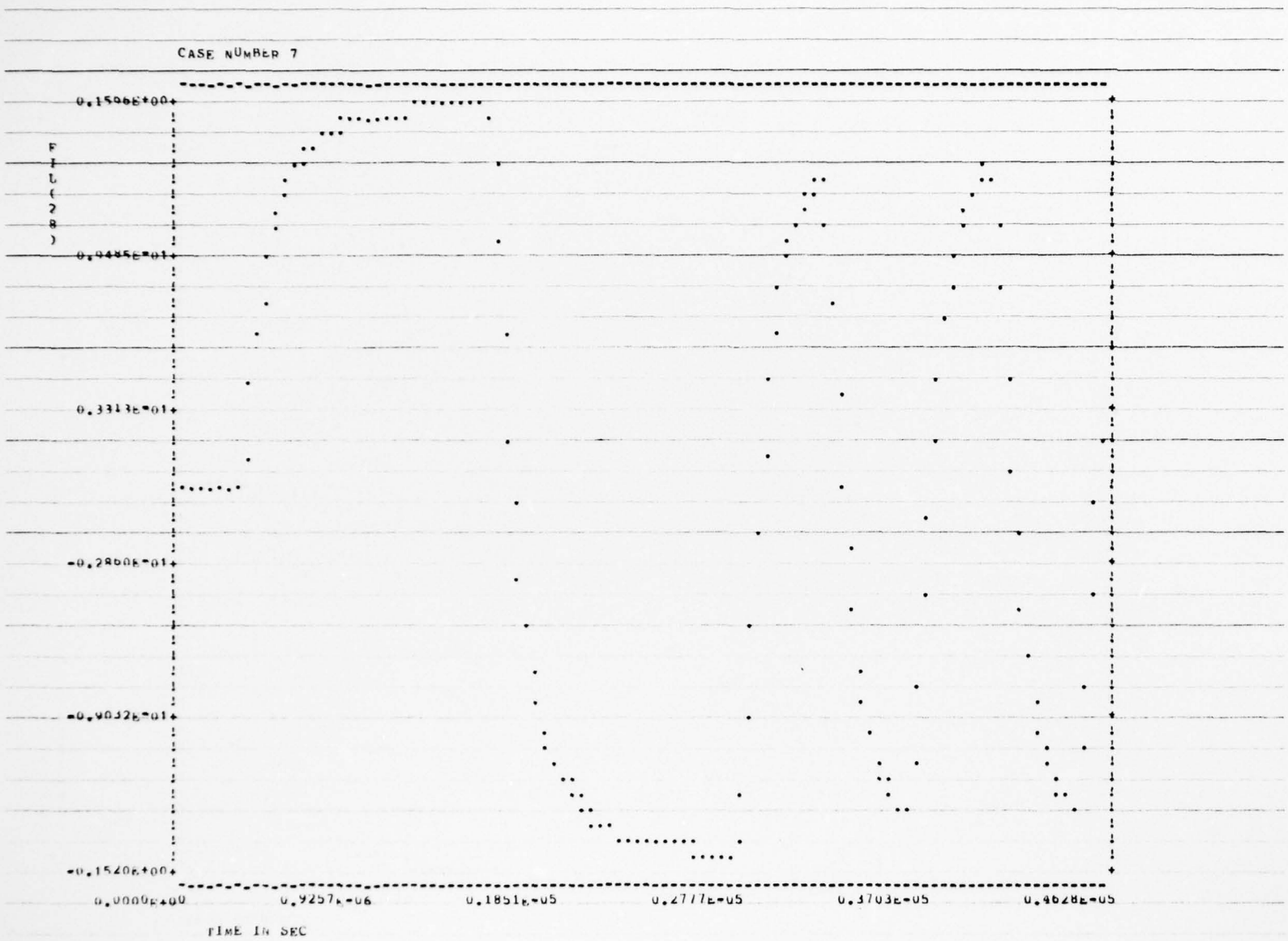

CASE NUMBER 7
STUB(221)
0.1637E+00
0.9847E-01
0.3442E-01
-0.3054E-01
-0.9529E-01
-0.1600E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

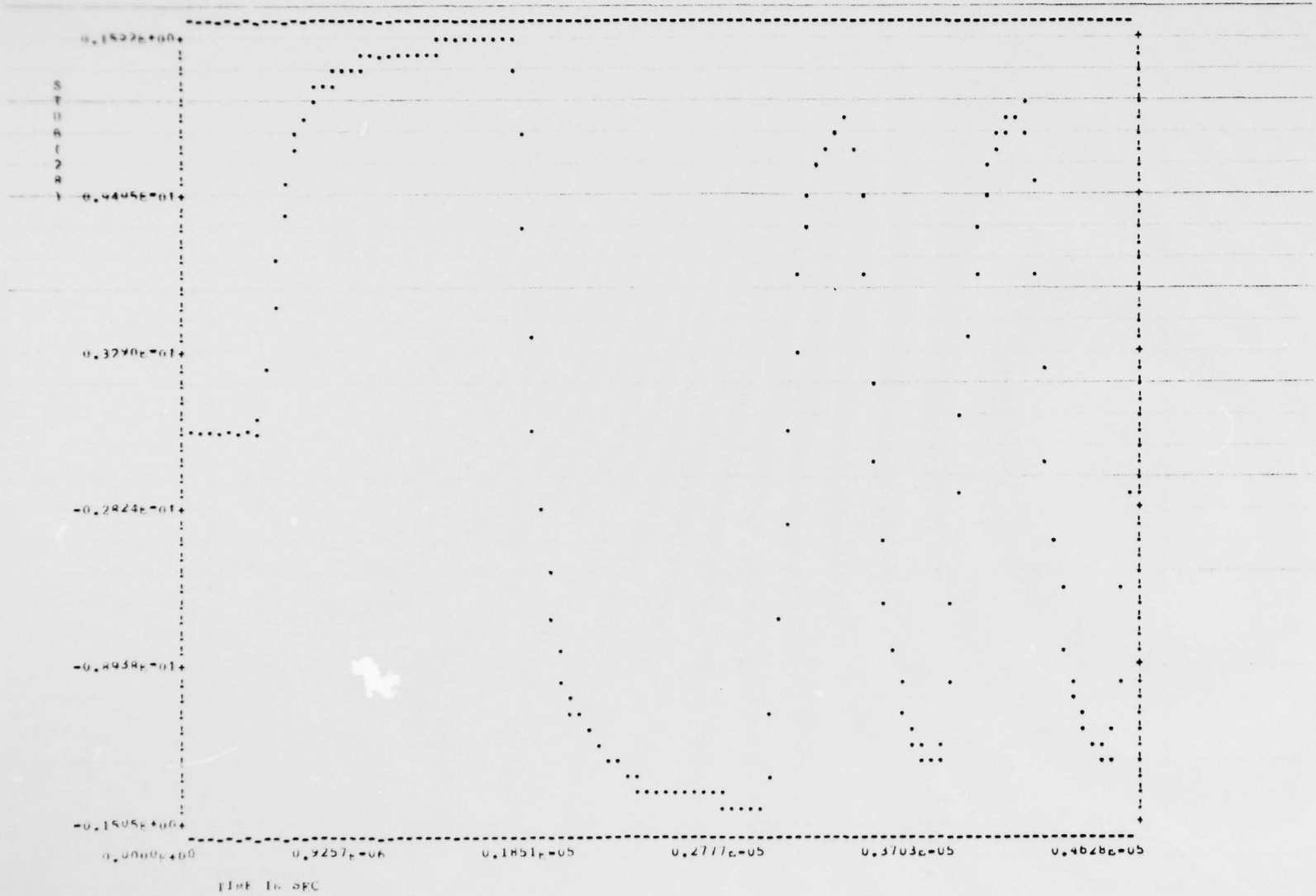

CASE NUMBER 7
F(24)
0.1621E+00
0.0804E-01
0.3398E-01
-0.3068E-01
-0.9415E-01
-0.1582E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC


CASE NUMBER 7
0.1607E+00
0.9742E-01
0.3375E-01
-0.2971E-01
-0.9318E-01
-0.1566E+00
STUB(24)
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

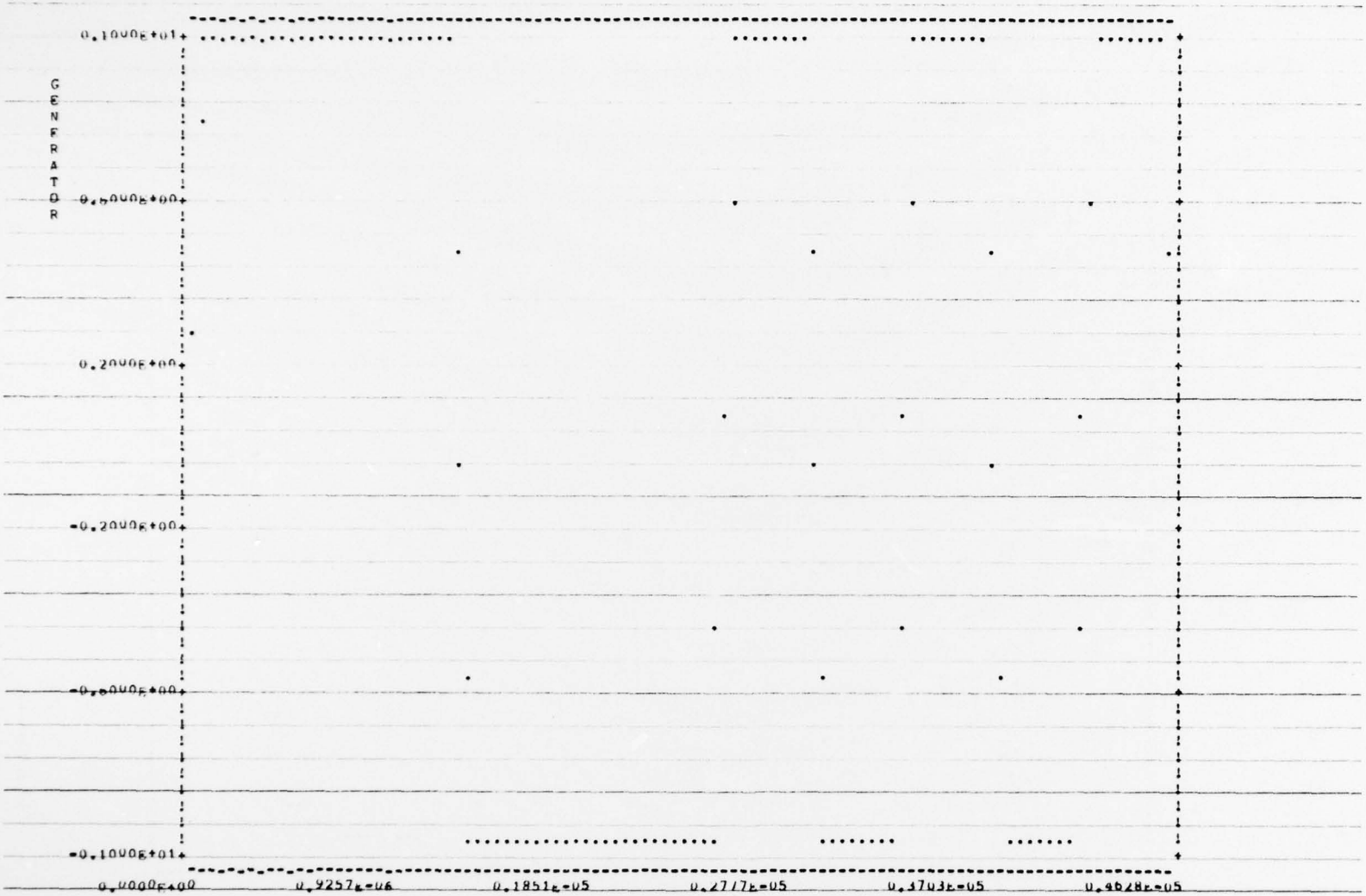

CASE NUMBER 7
0.1592E+00
F
I
L
(
2
6
)
0.9639E-01
0.3354E-01
-0.2931E-01
-0.9216E-01
-0.1550E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC


CASE NUMBER 7
0.1578E+00
0.9538E-01
0.3341E-01
-0.2895E-01
-0.9141E-01
-0.1535E+00
STUB(26)
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC


CASE NUMBER 7
0.1596E+00
F
I
L
(
2
8
)
0.9485E-01
0.3313E-01
-0.2860E-01
-0.9032E-01
-0.1520E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC


CASE NUMBER 7
STRAIN 1
0.1832E+00
0.4445E-01
0.3240E-01
-0.2824E-01
-0.4938E-01
-0.1505E+00
0.0000E+00
0.9257E-06
0.1851E-05
0.2777E-05
0.3703E-05
0.4628E-05
TIME IN SEC

CASE NUMBER 7



JOB COMPLETED